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HEARINGS

BEFORE THE

COMMISSION TO INVESTIGATE THE PNEUMATIC-TUBE POSTAL SYSTEM

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DECEMBER 2, 3, 9, AND 17, 1912, AND
JANUARY 8, 25, AND 29, 1913

U. S. Department of the Interior postal commission



WASHINGTON
GOVERNMENT PRINTING OFFICE
1913

PNEUMATIC-TUBE POSTAL COMMISSION.

Hon. SIMON GUGGENHEIM,* Senator from Colorado.
(Chairman to March 1, 1913.)

Hon. HOKE SMITH, Senator from Georgia.
(Chairman from March 1, 1913.)

Hon. WILLIAM O. BRADLEY, Senator from Kentucky.
(Member from March 1, 1913.)

Hon. FRED L. BLACKMON, Representative from Alabama.

Hon. VICTOR MURDOCK, Representative from Kansas.

Hon. JOSEPH STEWART, Second Assistant Postmaster General.

Mr. JAMES F. BELFORD.†
(Secretary to March 1, 1913.)

Mr. MALCOLM JOHNSTON.
(Secretary from March 1, 1913.)

* Senator Guggenheim resigned as chairman and as a member of the commission on March 1, 1913, his term as Senator expiring March 3, 1913, and Senator Smith was elected chairman to succeed him. Senator Bradley was appointed to succeed Senator Guggenheim as a member of the commission.

† Mr. Belford resigned as secretary on March 1, 1913, and Mr. Malcolm Johnston was elected to succeed him.

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PNEUMATIC-TUBE SERVICE FOR THE MAILS.

HEARINGS BEFORE THE JOINT COMMISSION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE UNITED STATES, APPOINTED UNDER AN ACT OF CONGRESS APPROVED AUGUST 24, 1912, REGARDING THE PNEUMATIC MAIL SERVICE.

WASHINGTON, D. C., *Monday, December 2, 1912.*

The commission met at 3 o'clock p. m.

Present: Senator Simon Guggenheim (chairman), Senator Hoke Smith, Representative Fred L. Blackmon, Representative Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

The CHAIRMAN. If there are any gentlemen here representing the Pneumatic Transit Co., of Boston, the commission would like to hear from them.

Mr. SAMUEL L. POWERS. Mr. Chairman and gentlemen of the commission, I represent the American Pneumatic Service Co., of Boston, which is the owner of the stock of the subsidiary companies furnishing pneumatic-tube service in the cities of Boston, New York, Chicago, and St. Louis. We are not interested in the plant that is constructed in the city of Philadelphia; the owners are also represented here by Mr. Delano, of New York.

The parties that appear here as representing the American Pneumatic Service Co.—and I give their names so that they may appear as part of the record—are: William H. Ames, president of the company; Gilmer Clapp, treasurer of the company; Robert S. Ingram, secretary of the company; and also Col. Charles H. Hayden, a member of the executive committee and head of the banking house of Hayden, Stone & Co., that has had to do with financing the proposition for a number of years. We also have Mr. B. C. Batcheller, who is the chief engineer of the company located in New York, and M. L. Emerson, the operating engineer.

I will say, Mr. Chairman and gentlemen of the commission, that we are here to aid you in making this investigation, which is, we understand, your duty under a resolution passed in the last session of Congress, and we want to give you all the possible assistance we can. All our books and papers are open to your inspection. We have endeavored to anticipate, to some extent, the information that we had that would be required by you and we have tabulated the statistics in connection with these companies. I am not going to unnecessarily take up the time of the commission. I assume that the hearings must, more or less, be informal, but it is our desire that you

shall have access to all information in any way connected with the companies which we own and operate.

Col. Hayden is obliged to return to New York to-night. He knows the financial side of this proposition perhaps as well as anyone, and I am going to ask you, Mr. Chairman, if it is agreeable to the commission, to hear Mr. Hayden at this time.

The CHAIRMAN. It is entirely agreeable, and we would like to hear from Mr. Hayden now.

STATEMENT OF MR. CHARLES H. HAYDEN, OF NEW YORK.

Mr. HAYDEN. My firm has been connected with this company as bankers for a period of some six or seven years. The capital of the parent company, the American Pneumatic Service Co., is somewhat in excess of \$13,000,000. The business of the company is divided into two very distinct branches; one branch is known as the Lamson Co., which is largely given to pneumatic tubes and other devices for internal work, and the other branch is that which is given over exclusively to exterior work for tubes for transmitting the United States Government mail. It is that branch of the business that I understand we are to take up at this hearing. Owing to the fact that various States require a local corporation to have a franchise in their cities for these tubes, it has become obligative for the parent company to organize in each State where mail tubes were constructed a corporation in that State. Therefore, instead of the American Pneumatic Service Co. owning mail tubes in different States in fee simple, it owns the securities, bonds, notes, and stock of four different companies which operate four sets of tubes, to which Mr. Powers has referred, in Boston, New York, Chicago, and St. Louis. The figures as to the cost of those tubes, which our books which are open for investigation will show, are estimated, roughly, to have cost about \$7,200,000.

In addition to my position as banker for the company, comes up the question of having purchased many of their bonds and underwritten their securities, which are now very widely scattered among the general investing public throughout New England, which would that way make me, so to speak, the spokesman and representative of what might be called the owners of the company, in that the shareholders are naturally the owners of any corporation.

What has, from our point of view, brought this matter to a climax, you might say, is the method of conducting this business on our part in order to conform to the formal contract which the United States Government has tendered us and under which we are operating. That contract is a contract for a period of 10 years. The present contract was entered into in 1906, and therefore has some three years and a fraction yet to run. Under that contract we are receiving a flat rental of \$17,000 a mile, and we are operating approximately 46 miles of tubes. The first charge against that income from our corporate standpoint is the cost of operation. After that comes the question of such interest as we must necessarily pay in order to borrow or raise the money with which to build these tubes. In addition to that, we are confronted as a private corporation with the question of paying a franchise tax, which differs in various States, amounting

in the case of the Chicago system to 5 per cent of our gross income. Another feature, which you will soon see is very detrimental to our carrying on the present system, is the fact that our Chicago franchise at its expiration becomes, without any payment to us whatsoever, the property of the city of Chicago.

Now, whenever any banker asks his clients for money it is imperative that he should show them first that they are going to get a reasonable return on that investment, and, second, that they are going to get their property back. Now, that has been becoming more acute annually, as you will readily see, and if we build any extension to these tubes to-day on a contract that has only three and a half years yet to run we are up against the proposition in three and a half years of how we are going to get our principal back. Of course you may say that another administration may decide to renew these contracts for another series of years, but you can not ask investors to give you money with that uncertainty.

Further than that, of late, since we have perfected these tubes so that they are operating well, we have had a number of demands for an extension of the service, and we have simply been unable fairly to the people who have made us their trustees to make these extensions, because we could absolutely in no way assure them that there was any chance of their getting back the principal of their investment; and that, of course, until three and a half years from now, when the question of another contract will be taken up, means that we have to stand perfectly still; we can do nothing for the Government in the way of extending the tube service.

Mr. MURDOCK. Do you believe the annual rental of \$17,000 is too small?

Mr. HAYDEN. If there were a way of making a contract, Mr. Murdock, by which we could see that at the expiration of that contract the Government would pay us what we had actually expended in constructing the service, I think very likely that \$17,000 a mile would be fully a fair rate. In other words, I mean by that that if you take the rental we are receiving on the cost of our tubes and deduct from that the cost of operating, we might be getting a reasonable interest in return as long as that lasted, but if a man spends \$6,000,000 or \$7,000,000 for a set of tubes and receives 6, 7, or even 10 per cent for a few years on it, and then finds that the whole hundred per cent of principal is gone, he has gotten back a very small portion of what he was worth before he went into the enterprise.

Mr. MURDOCK. Are you acquainted with the early construction of the first tubes in Philadelphia?

Mr. HAYDEN. I am not, because we have nothing to do with the Philadelphia Co. It is not owned by us or connected with us in any way, shape, or form.

Mr. MURDOCK. My recollection is that the annual rental in the beginning was \$10,000 per mile, and now it has been increased to \$17,000, and yet the men who own the tubes are not asking for more increase of rentals; they would like to dispose of the tubes. Is that a correct statement?

Mr. HAYDEN. I think that is a very correct statement.

Mr. MURDOCK. They do not wish to own the tubes any longer; they would like the Government to take the tubes over?

Mr. HAYDEN. If you will allow me to qualify your statement, I would say that an investigation would show that if you would assure us of a return of the property at the expiration of a contract; that is, that the contract can be made for perpetuity or that a compensation for the principal outlay returned to us at the expiration of a limited contract, then I think that \$17,000 a mile for tubes that are now constructed might be shown to give a reasonable return.

Mr. MURDOCK. How much do you apply to the deterioration of your plant?

Mr. HAYDEN. Nothing.

Mr. MURDOCK. As a matter of fact, is not the wear and tear particularly on the cartons that pass from place to place considerable and the expense in connection with that considerable?

Mr. HAYDEN. I would rather leave such questions as that to be answered by our engineers, if that is agreeable to you, Mr. Murdock.

Mr. MURDOCK. Certainly.

Mr. HAYDEN. The engineers are here and will be glad to answer any questions you desire to put to them. I merely wanted to touch on, purely and simply, what the position of the owners of this property is toward the United States Government, because it has seemed to me that that was the crux of the whole thing. Are we here to get an abnormal price for what we own? That is a perfectly natural question. Where is there any advantage in the Government buying these tubes if there is a great advantage to us in selling them? You know, Mr. Murdock, if there was not a buyer and a seller to every transaction there would not be any business in this country.

Mr. MURDOCK. Do you feel yourself menaced at all with new devices which would supersede your plant?

Mr. HAYDEN. Not in the slightest. In other words, it is my individual opinion, from the association we have had with this company for a series of years, that we have in the present 8-inch tube, which is running through the streets and transporting your mail, something which will be a desirable and serviceable thing for a great many years to come; something which is not going to deteriorate, as our engineers who have constructed these works will assure you.

Mr. MURDOCK. On the investor's side, about three or four years ago in the Post Office bill which passed Congress, a tender was made of new contracts to any one who would take them by the Government for tubes in Cincinnati, Kansas City, and San Francisco. The Government, as I understand it, never received any offers from anyone to build those tubes. Why did the investing public generally stay away from that proposition?

Mr. HAYDEN. Because of the very point that I have just pointed out to you; that we had no assurance whatsoever of any possible way of getting our principal back. That is the absolute reason. While the total amount of money that we need to raise is small, yet I do not think there is a banking house in the United States that can risk its reputation, which it may have worked hard to build up, by advising investors to buy these securities with the knowledge staring them in the face all the time that on the limited contract which it is possible for them to get to-day with the Post Office Department they may not get their principal back. Further than that, you take a case like the city of Chicago; you know that if the Government of the United

States owned these tubes and the right to build additional tubes, it would not be a case of the board of aldermen saying we are going to hold up the United States Government; they have to pay us something. No; it would be exactly the opposite. It would mean that the citizens would be crying to their board of aldermen to get them these tubes. But what is it we pay? We must first pay a big franchise tax and allow our tubes to be confiscated by the city at the expiration of the franchise.

Mr. MURDOCK, we can not raise the money. This company is rich; it has been ably financed; we have no floating debt whatsoever; we have \$600,000 or \$700,000 in cash on deposit in the banks to-day. We are in a very strong position, because we have a manufacturing business which requires us to be strong, but we do not dare spend this money to-day. The Post Office Department has asked us to construct a series of tubes from the Times Square to the general post office in New York. We would like to do so. There has been a suggestion of a tube to run from the Pennsylvania Terminal Station to the Grand Central. We would like to build that tube, and build it with our own money; but how are we going to get the principal back. Furthermore—and I know that this has nothing to do with Mr. Stewart having exacted these things, but it is the law—assume that we have a tube running up from down town to Forty-second Street, for instance, up Fifth Avenue, which may have been an easy street to build. It then goes across Forty-second Street 500 feet to the corner of Third Avenue, where we have a post office. Now something happens; the building is torn down or something else needs to be built there, and they notify us that the post office will be at the corner of Forty-second Street and Seventh Avenue, which is possibly equally distant from Fifth Avenue. We then have to abandon 500 feet of tube which may have cost us tens of thousands of dollars and we get nothing for it. We then have to build 500 feet in another direction, and when we get there we do not get 1 cent more than when that order was first given us. We always contended that there was nothing in the law that obliged us to do that, but the Post Office Department has contended that it was obligatory. The practical answer is that up to date we have spent in excess of \$150,000 on changes of post offices and stations for which we have not increased our rental 1 cent.

Mr. MURDOCK. What was the original design in the mind of the investor in going into pneumatic tubes with respect to getting back the property at some time? He knew that necessarily his only customer would be the Government.

Mr. HAYDEN. The answer to that would go back to my first statement, Mr. Murdock, that there are two branches of this business, and the oldest branch is the one that goes back for many, many years to the indoor service which exists, as you know, in your dry goods stores in the use of wire carriers, until finally they developed the pneumatic tubes such as you have seen in Wanamaker's and other stores. Then came the question of enlarging this tube for exterior work so that the original securities were issued before all of these contracts with the Government, and it became the policy of gentlemen, who are not connected with this company to-day, that that was a risk which they, being free lancers, were willing to take. It is a risk which we, a banking house, are not willing to take. So we have brought the

matter to a standstill, by which we are going to continue to operate the tubes now built as long as we have a contract to do so, and if three and a half years from now you offer us a renewal of contract, we shall endeavor to show you that we are entitled to a larger rental, and we will show you every book that we have. There is absolutely nothing connected with the management of this company to-day which does not invite the most complete and full inspection. We will show you that we are entitled to more than \$17,000 per mile. We are entitled to that fully if it is a perpetual contract, and we are as entitled to as many times that as you limit the duration of the contract so as to enable us to get back our 100 per cent of principal.

Now, what is the position of those of us who are trustees for the owners of this property, in that we are the directors, as to why we should sell these tubes and at what price we should sell them? First, our reasons for selling them is that it does not seem feasible for the Government to give us a contract which is of sufficiently long life and of a sufficiently high annual rental to enable us to get 6 per cent, we will say, and an additional sum which will amortize, at the same rate, the properties at the expiration of the contract. If we could get such a contract as that there is no reason why we would not build you tubes of any design you want, large or small, no matter how many millions of dollars it cost; so we can say to the people that we ask to subscribe to bonds, "Here is the basis on which we are going to build these tubes—this is the rental, this is what you will get back in interest, and here is where you get back your principal."

Now, if that is feasible, it does not even seem necessary to take up the question from our standpoint of a sale of the Government; but when we look at it from the Government's standpoint, it seems to me there is entirely a different situation arising.

Mr. MURDOCK. As a matter of fact, this Government did suspend all pneumatic-tube service for a couple of years some time ago, did it not?

Mr. HAYDEN. I could not answer that question. That is before my connection with the company, Mr. Murdock.

Mr. MURDOCK. Did that materially affect the price of these securities?

Mr. HAYDEN. I could not tell you. I had no connection with the company at that time; but, Mr. Murdock, I might answer that in a way that you will possibly consider a perfectly fair answer, when I tell you that in 1900 and 1901 a small part of the outstanding securities of this company was represented by mail-tube construction. We were then largely the Lamson Co., because they have never had a banking house as regular bankers until my own firm took that position some six years ago, and, in consequence, it has been a continual pouring in of money to build these tubes since that time.

Now, following out what I was saying about the Government's standpoint, you would not have to pay the franchise tax; you would not have to borrow the money as we do on an average of 6 per cent; and you would not be confronted with the question of a forfeiture of a franchise as we have been in the city of Chicago, where they have taken such action.

Mr. MURDOCK. At the expiration of how many years?

Mr. HAYDEN. That was a 20-year contract, which expires in 1923.

Mr. MURDOCK. And the contract then goes over to the city of Chicago?

Mr. HAYDEN. Yes; in 1923.

Now, we have prepared in a preliminary way for your inspection—and you can follow the matter up as far as you wish—figures to show, first, what our rental has been, which for the sake of argument I will say is \$760,000 to-day; our cost of operation, \$380,000. Therefore, if you owned the tubes, the United States Government would annually appropriate for the same service it has to-day one-half of what it is now appropriating. You would save the United States Government one-half of what it is now spending in rentals for this system. The second thing you would do would be to make it possible at once to extend at your own pleasure, in your own way, in whatever cities you desire, and in the present cities as many extensions as you want of the present tube service. What would our attitude be in that regard? First, we consider that if we should sell our present tubes to the Government, coupled with that sale and at no charge to them, we should have to give to them and deliver to them—which we would do—the right to use every one of our patents now held or that we may subsequently become the owners of and all the appliances that we have for the purpose of transacting the postal mail business of the United States in its present tubes or any extensions that they may at any time build.

Mr. STEWART. If the Government should build without your intervention, would the Government still have the right to use your patents?

Mr. HAYDEN. Do you mean in case you bought these tubes?

Mr. STEWART. Yes.

Mr. HAYDEN. We would give you a license without any expense on your part to use now and ever afterwards all our appliances and patents that should be of any benefit to you for the purpose of transporting mail in the mail service; that is, you would have to give us a contract to build the extensions; you would not have to give us a contract to build in any city, but having bought our interest in the present mail-tube system, you would become the owner of those patents for the mail-tubes postal department work. There would be no royalty, no cash payment for their use whatsoever, and no obligation on your part to employ our engineers or constructing force unless you saw that it was to your advantage to do so.

Mr. STEWART. That is the point I desired to bring out.

Mr. MURDOCK. How much is the entire company capitalized for at the present time?

Mr. HAYDEN. I think slightly in excess of \$13,000,000, of which \$7,250,000 represents the securities which we have been obliged to issue to pay for the four systems which we own.

Mr. MURDOCK. In a capitalization plan of that kind what is the actual outlay of money?

Mr. HAYDEN. \$7,250,000 in cash.

Mr. MURDOCK. And you have \$13,000,000 securities against this?

Mr. HAYDEN. No, sir; this company owned before the mail-tube business was gone into the Lamson Co. which does all this interior store work, therefore, only so much of the \$13,000,000 as is represented by the parent securities that we have had to sell to raise the

\$7,250,000 which we have given to the four subcompanies would be the portion applicable.

Mr. MURDOCK. Have you any preferred stock?

Mr. HAYDEN. Our capital is, roughly speaking—of course you understand that I am carrying these figures merely in my memory—\$700,000 of first-mortgage 5 per cent bonds. That is part of a very much larger issue, but that is the amount actually in the hands of the investors; \$1,500,000 of the 7 per cent first preferred stock which was only issued in 1910, and which was issued and underwritten by Hayden, Stone & Co. for the purpose of supplying funds for the paying off of the floating debt incurred in recent mail-tube construction in New York and other cities, principally New York, and, second, to supply the company with plenty of money with which to build the other tubes which Mr. Morgan, the postmaster at New York, has intimated he would like to see built; and that money which we have on hand now is partly the balance of that money and partly the earnings of the Lamson Co. Following that is \$6,300,000 in second preferred stock.

Mr. MURDOCK. Is that at 7 per cent?

Mr. HAYDEN. The second preferred stock pays what it can. It is paying at the present time 2 per cent.

Mr. MURDOCK. Is the first preferred stock accumulative?

Mr. HAYDEN. I think it is. Following that is \$5,000,000 of common stock, which amount of stock has been \$10,000,000 until a few months ago; the stock was selling at such a very low figure that we felt we should reduce the par value from \$50 to \$25 a share, and so the common stock now is \$5,000,000, being 200,000 shares par value \$25, instead of 200,000 shares par value \$50.

Mr. MURDOCK. Are the affairs of both the Lamson Co. and the exterior tube transactions so intermingled that you can not divide them?

Mr. HAYDEN. Not in the slightest. The American Pneumatic Service Co. holds in its treasury 98½ per cent of the stock of the Lamson Co. It holds in its treasury practically the entire capital stock of the four mail-tube companies of different States. Consequently, in a sale, if such a sale were made to the Government, you would purchase in fee simple, not from the American Pneumatic Co., but from the trustees of those four mail companies, the property which they own in four separate and distinct States. You would in no way have to affect its corporate existence in any way, shape, or form. Those four companies are called the Boston, the New York, the Chicago, and the St. Louis Pneumatic Tube Companies.

Mr. MURDOCK. Do you differentiate between what part of the money belongs to the exterior work and what belongs to the interior work?

Mr. HAYDEN. Each of the mail-tube companies is an absolutely distinct corporation. Its books are kept as absolutely distinct as if we had no connection with the parent company. Its earnings and expenses are distinct, and if there is an excess of income over expenditures that company declares a dividend. Its bank accounts also are distinct, and the parent company merely receives from those various companies such dividends as their boards of directors declare, and simply those dividends being declared to the shareholders at the respective companies and the shares being in the treasury of the

Pneumatic Tube Service Co. The American Pneumatic Service Co. thus acquires the cash that is thereby declared as a dividend; so that in an investigation of our books you would not find the slightest difficulty in ascertaining what each company's rental is, what each company's operating expenses are, what each company's various franchise taxes and interest are, what each company's dividends are, and what each company has received from them. Those figures are here compiled, and our auditor can give you a copy of them.

Mr. MURDOCK. If the Government should take over the pneumatic tube the first public criticism would be, if there was a public criticism, that the original company was overcapitalized. What about that proposition?

Mr. HAYDEN. The answer to that would be simply this: I think that when a man wants to sell something he is pretty apt to sell it at a reasonable price if he wants to get rid of it. We want to get rid of these mail tubes, because you people do not see your way clear to give us a contract that will assure us of our principal, and we propose to open our books to you so that any auditor can examine and certify as to exactly what those cost in cash. That is what we ask you to do.

Mr. MURDOCK. And we can arrive at that information without much difficulty?

Mr. HAYDEN. Without the slightest difficulty in any way.

The CHAIRMAN. Have your companies franchises in the cities in which you operate?

Mr. HAYDEN. The reason we formed the companies was because it was necessary to get the franchises. Each of those companies has its franchise.

The CHAIRMAN. Do you know for how long a time these franchises run?

Mr. HAYDEN. I would have to refer to some of the other gentlemen in order to ascertain that. We have told you with reference to Chicago; the others are indefinite, what you might call perpetual, the right of eminent domain.

The CHAIRMAN. How about Boston?

Mr. HAYDEN. Boston is a perpetual contract. I think they are all except the one at Chicago.

Mr. MURDOCK. Will you give the commission current quotations on the securities?

Mr. HAYDEN. The bonds, par; the first 7 per cent preferred stock, par; the second preferred stock, 24 (par \$50); the common stock, 5 (par value \$25).

The CHAIRMAN. These shares are being dealt in, I presume?

Mr. HAYDEN. They have been listed on the Boston Stock Exchange and reasonably actively dealt in for a great many years.

Mr. MURDOCK. Do you remember a maximum on common stock?

Mr. HAYDEN. \$28 or \$29 in 1906.

The CHAIRMAN. Were these shares pretty widely distributed?

Mr. HAYDEN. I would like to ask Mr. Ames, the president of the company, if he does not have it with him, to wire for a list of stockholders to be sent on; they are very widely distributed among a very large list of small stockholders—over 3,000 shares. The bonds were likewise very widely distributed.

The CHAIRMAN. The mail-tube service is only a part of your system?

Mr. HAYDEN. The mail-tube service of those four companies is the only part that refers to this hearing. The most of our business is the business of the Lamson Co., which has nothing to do with the United States mail service, and that would continue. That is the business of store service; and, incidentally, we are building—not on a rental basis, as we did this—ammunition hoists for the United States Navy. That, however, is a part of the Lamson Co.'s business and has nothing to do with these mail tubes.

The CHAIRMAN. You have furnished tubes to hotels and office buildings?

Mr. HAYDEN. Yes; that is part of the Lamson Co.'s business.

Mr. STEWART. Do these bonds and stocks to which you have referred relate to the entire business of the company?

Mr. HAYDEN. Yes, sir; all the subcompany's securities are in the treasury of this parent company or under the trustees of the mortgage.

Mr. STEWART. I think I understood you to say that in case the Government purchases the Government would deal directly with the trustees, who would transfer fee-simple title to the property?

Mr. HAYDEN. Now, you are taking me from the province of a banker to the province of a lawyer, but I will answer that by saying that it is my judgment as a business man that you would simply purchase from the trustees the fee-simple property in these various cities. We would probably on our own books have to divide your lump-sum payment to the proportionate respective parts for the four companies, and that would become a treasury asset of the parent company ultimately, and the first use of that money naturally would have to be to retire bonds, then first preferred stock, and the balance as general capital against the cash which this company has received from its sale at par of its second preferred stock. The trustees would naturally go to the shareholders of the parent company for approval of their action in selling these tubes, without asking for anything for patent rights which have cost us in the past a good deal. That we anticipate we could get, because we should recommend it unanimously.

Mr. MURDOCK. How much have you actually put in the construction of these tubes?

Mr. HAYDEN. \$7,250,000.

Mr. MURDOCK. That, however, is the security figure. What was the actual outlay?

Mr. HAYDEN. No; you have not gotten that quite right. That is the securities on the subcompanies which have been issued and are in the treasury of the parent company.

Mr. MURDOCK. I understand that perfectly. In other words, you are almost a holding company for these other companies, although you were the parent company and not the creature of the different companies. But what was the actual money put into the construction of these tubes?

Mr. HAYDEN. To the best of my knowledge and belief it is \$7,250,000. The amount of securities which we have issued is very materially in excess of that, very materially, because, of course, the

common stock we have just charged off \$5,000,000 that was carried to represent patents.

Mr. MURDOCK. Some years ago there was an investigation of this subject, and I remember that the committee found at that time that the tubes had cost something like \$4,000,000 or \$5,000,000.

Mr. HAYDEN. What year do you think that was in?

Mr. MURDOCK. In 1907, I think.

Mr. HAYDEN. Do you realize what we have built in New York since that time?

Mr. MURDOCK. That is just what I want to ask you; has your \$2,000,000 in excess of that amount been for new construction?

Mr. HAYDEN. I would not want to answer that question just in that way, because our auditor can answer that better for you.

The CHAIRMAN. If there are any copies of the statement, including the figures to which you have referred, available, I wish you would present one to the stenographer to be incorporated into the record.

Mr. HAYDEN. We shall furnish them for that purpose. Mr. Murdock, of the \$7,250,000 it will interest you to know that we only figure the cost in Boston at \$384,000; the cost in St. Louis at only \$279,000; the cost in Chicago, and we had to build a tunnel under the Chicago River a year ago, was only \$1,000,000; the balance, amounting to over \$5,500,000, is this very extensive and expensive work that we have been doing in New York. It was in 1906 that Hayden, Stone & Co. underwrote that issue of preferred and common stock, which amounted to \$1,250,000, and of second preferred stock at par with a common-stock bonus. In 1910 we underwrote \$1,500,000 of this first preferred stock. So that answers your question as to the money expended.

The CHAIRMAN. If the Government should buy the tubes, what is it expected to give as a fair return to the owners of the common stock who received it, in a good many instances, as bonus?

Mr. HAYDEN. Nothing. Put that right down here for me—nothing. I do not want to see the United States Government pay any man one dollar for anything that this company ever issued as a bonus.

Mr. MURDOCK. Well, what, then, becomes of the individual holder of common stock?

Mr. HAYDEN. The individual who has that common stock has got to rely on the ordinary industrial development of the Lamson Co. to make that stock of value, just as the man who has got Sears-Roebuck stock, which he got for practically nothing, has seen that stock become of value.

Mr. MURDOCK. However, \$7,000,000 of valuable property of which he was a part owner has passed from him.

Mr. HAYDEN. But in a sale the first portion money of that would be used to retire the first-mortgage bonds; the second amount of that money would be used to retire in calling in the first preferred stock, so that then the common-share holder would find himself in a position of being a very much nearer heir to the throne than he was before.

Mr. MURDOCK. Yes; and that would accrue to his benefit.

The CHAIRMAN. The stockholders are not the same; that is, those who own the preferred stock do not hold the common stock, and vice versa?

Mr. HAYDEN. They have nothing to do with each other. In fact, answering what Mr. Murdock said to me a little while ago—and I dislike very much to put this statement in the record—we offered this 7 per cent first preferred stock to our shareholders at par for the purpose of getting this mail-tube service for extension; but our shareholders thought we were unwise, and they subscribed exactly 4 per cent of that stock, and the Hayden, Stone Co. subscribed the remaining 96 per cent.

Mr. MURDOCK. As the holder of the common stock approaches nearer the throne his common stock will increase in value and in market quotations?

Mr. HAYDEN. That would depend entirely on his view as to how rapid the manufacturing business of the Lamson Co. may be developed to earn dividends on that common stock. Personally, I do not think that the sale or retention of these tubes would materially affect the price of that common stock favorably, but I can see how, at the end of three and a half years, if we do not sell them and the Government does not renew its lease of them, but goes back to horse and wagon, it would wipe out the common stock.

The CHAIRMAN. You would not want your concern to dry up, but you would extend your enterprises in some other direction?

Mr. HAYDEN. That money would be used to enlarge our manufacturing business of the Lamson in building ammunition hoists and in such other general business of an allied nature as the Lamson Co. is now doing. In fact, the operating head of the Lamson Co. for the last few years has strenuously objected to the new capital which this parent company has raised being devoted exclusively to building mail tubes in New York when he has been willing to show us that we could have made more in manufacturing interior plants. In that connection, you will recall, Mr. Murdock, that we have built a similar tube to those which you leased for the United States Government simply as an ordinary manufacturing proposition for the appraisers' stores in New York City.

Mr. MURDOCK. That resolves itself, then, back to its final and fundamental basis; that is, that this company has one business which is very prosperous—the parent company—of interior pneumatic-tube transmission, and the outside transmission has only one customer, namely, “Uncle Sam,” and it is not profitable.

Mr. HAYDEN. It is not.

Mr. MURDOCK. And that the company would like to get out of the exterior business and turn it over to the Government on the theory that it is a legitimate function for the Government to own those tubes.

Mr. HAYDEN. Correct.

The CHAIRMAN. On whose valuation?

Mr. HAYDEN. On such valuation as you gentlemen, after careful consideration, should name to the United States Government as being fair to both parties.

I think that each of you gentlemen, individually or collectively, can devise something that strikes you as fair. Possibly you would like to know the workings of my mind, and I say this simply to put a suggestion in your minds, nothing more; you say, What have you got up your sleeve; what are you thinking of? We thought this: You could make all these investigations to find out what it actually cost; what it earned gross; what it earned net, and then see how this

strikes you as a reasonable figure for us to ask; that we will sell you these tubes for the sum of money which will show you that it will earn 6 per cent legal rate of interest for the United States on the annual savings which you will make over and above what you are now paying. In other words, this is to be a recommendation on your part to your Congress as an economy for the Government; that the price which you propose to pay for these tubes will assure the United States Government an income of 6 per cent per year in savings on the price that they have paid for it over and above what they pay to-day.

Mr. MURDOCK. When a discussion was up some years ago for the physical valuation of railroads, some one in the Interstate Commerce Commission formulated a plan for arriving at the actual physical valuation, namely, by taking the cost of construction, the cost of reproduction, and the going value and making an average on the three. Would that be fair in this instance?

Mr. HAYDEN. I should like to figure it out; and if you were in my place, I think you would. Offhand, I should say it sounded very fair. I can not see in this instance anything about our business where such a valuation would be unfair, but I would be very loath to stand here and take the sole responsibility without consulting the other directors of the company as to what was fair, and you would not ask me to; but I should think, as an abstract proposition, that it was fair.

Mr. MURDOCK. If we are to purchase these tubes, the crux of the proposition is how are we to arrive at their value?

Mr. HAYDEN. By finding out what they cost first.

Mr. BLACKMON. What they cost you and what they would be worth to us.

Mr. HAYDEN. Exactly.

Mr. MURDOCK. What about the cost of reproduction?

Mr. HAYDEN. We would like to have you put your engineers to work on that question and secure an estimate, Mr. Murdock.

Senator SMITH. The problem as to what they are worth to us would involve the question of what it would cost to undertake to duplicate them; that is, the question as to what they are worth to the Government would involve two problems: First, what it would cost the Government, independent of you, to provide similar means for the use of the Government, and what the means also would be worth to the Government if provided, whether constructed for the Government or whether yours were used. Both of those propositions, I understood, are involved in the question as to what they would be worth to the Government.

Mr. HAYDEN. Exactly. Of course, you understand that these tubes are patented devices, which patents have been issued to us by the United States Government; but we have eliminated the question of the patents in the discussion which Mr. Murdock and myself have had.

Senator SMITH. There are other patents. Therefore, we could take care of ourselves independent of the patents which you control.

Mr. HAYDEN. Exactly. We recognize all of that. We are not here trying to get one cent where the United States Government could do any better in any way, shape, or form.

The CHAIRMAN. Will the Commission be in a position to ascertain the cost of building these tubes?

Mr. HAYDEN. It seems to me, Senator, that the way you would want to do that would be to employ some independent engineer, who had no affiliations whatever with us, and have him first find out what it had cost us and make you his own estimate as to what it would cost to reproduce the same number of miles of tubes in the same location. It is a very different thing to build a mile of tubes in various locations.

Mr. MURDOCK. In any of these cases did you pay anything for franchises?

Mr. HAYDEN. When we built in Boston, Chicago, and St. Louis, no. Where we acquired the New York-Brooklyn company from a company which had previously built it that was not in a position to go on and complete it, the price that we paid to them in our securities and cash represented the value of that franchise in addition to the cash cost.

The CHAIRMAN. But in computing a valuation for the tubes do you include the value of the franchises?

Mr. HAYDEN. No; the figures we have submitted to you were two-fold, which Senator Smith referred to. First, we show what they actually cost in detail, each separate company, and, second, as to what might be a proper and fair price to pay. Merely as an example, say you were paying us \$800,000 to-day in rentals and say we operate these for \$400,000 a year, you would then, if you owned these tubes, only be paying \$400,000 a year instead of \$800,000 a year. Now, \$400,000 a year is 6 per cent on \$6,600,000; \$6,600,000 is about \$670,000 less than they cost us. Such a method of computation as that would require you to see whether or not our statements as to the cost of operation were correct, whether you could operate them for less. Our idea in this whole thing is to tell you the truth because of our inability to have a permanent franchise or a limited franchise with a clause for a return of property at its expiration.

The CHAIRMAN. With the Government?

Mr. HAYDEN. With the Government. That is the only thing which makes us see any object whatsoever in selling them.

Mr. STEWART. In offering that suggestion, Mr. Hayden, you are proceeding on the theory that we could operate them as cheaply as the company does?

Mr. HAYDEN. No, Mr. Stewart; I did not make that statement as narrow, quite, as that would appear. I said for you to put your own men on and see what it would cost you to operate those tubes, and then let us see whether that annual saving which you would make and which you, as the head of the Postal Department, could show to the United States Government, would clear 6 per cent on what you were paying in order to have clear title to these tubes, which, in addition to that, would give you the right to build such extensions as you wish in the present systems, such tubes as you may wish to build in other cities, the right to use all of our patents and appliances without any compensation to us now or in the future for them, and to build those tubes with or without our cooperation, as you saw fit.

Senator SMITH. Are your tubes of uniform size?

Mr. HAYDEN. I think they are all 8-inch tubes. Simply as a matter of information, but not touching on this direct point, Senator, Mr. Stewart and Mr. Morgan, the postmaster of New York City, went to Boston within the past 10 days to look at a 30-inch tube which we had constructed in a vacant lot a third of a mile long for

the purpose of seeing what a 30-inch tube would be like and what it would do. Mr. Batcheller, our engineer, who is here, can explain to you his views, which have always struck us as particularly sound, the fact that there is nothing about a 30-inch tube which makes it, taking into consideration the cost of construction and the cost of operation, anywhere near as available, except in special instances, to supplement an 8-inch tube service. That being technical, however, I would very much rather, if it is agreeable to you, that he would answer any questions in connection with it. You might interrogate him on that point.

The CHAIRMAN. Are there any other points, Mr. Hayden, which you desire to cover?

Mr. HAYDEN. I wish to answer any questions that any gentleman of the commission may desire to put to me. That is all I came for.

Mr. STEWART. What consideration do you think should be given the Government for depreciation?

Mr. HAYDEN. That is pretty nearly a technical question, in so far as it is a business question. I understand from my talk with Mr. Emerson and Mr. Batcheller that these tubes that have been underground in some cases 10 or 15 years have been examined in connection with other openings that were made and have been found to be in exactly as good condition as they were when originally laid.

The CHAIRMAN. Is the work of laying the tubes more expensive to-day than it was formerly?

Mr. HAYDEN. The new form of pavement being of concrete, and the pavement stones that are tarred in between, and the requirements of city officials for relaying the surface in the same position as it was originally, would make the cost of the construction of these extensions—especially if they were to be made in New York—more than they did in the first place. The cost of material has also increased considerably.

Senator SMITH. Have you given us the cost of operation?

Mr. HAYDEN. Yes, sir; before you came in, Senator Smith, I spoke on that subject. We have copies here showing information along that line for each member of the commission.

Mr. STEWART. Are you going to file a statement showing these items for the several cities separately?

Mr. HAYDEN. That is included in the statement I have already filed.

Mr. POWERS. I think it should be said, Mr. Chairman, that those statements cover the last fiscal year which closed on March 31.

Mr. MURDOCK. Did your company, Mr. Hayden, have anything to do with the construction of the tube which runs from the House Office Building to the House of Representatives?

Mr. HAYDEN. Nothing that I know of.

Mr. MURDOCK. Do you know anything about that tube?

Mr. HAYDEN. I do not. That would be a technical question. I know we have nothing to do with it in any shape or form, directly or indirectly.

Mr. STEWART. If the Government should purchase, as suggested, and desire to extend the service, would your company be available for building extensions?

Mr. HAYDEN. As far as I can answer that, yes, sir; and we would be very glad to build such extensions as they want, and build them on a basis such as you would determine would be a fair one from the standpoint of the constructing or manufacturing companies.

The CHAIRMAN. Mr. Hayden, if the commission should want to consult further with you, could you come over to Washington again?

Mr. HAYDEN. I can come over at almost any time within 24 hours' notice if the commission desires it.

The CHAIRMAN. We are very much obliged to you for your statement.

Mr. POWERS. Mr. Chairman, and gentlemen of the commission, I do not know in what order you desire to take up these hearings or how much longer you will want to sit to-day. We have here the engineers of the company, the auditor, and the secretary, and the figures here that have been made up largely by Mr. Emerson. Possibly you would like to have those figures discussed.

The CHAIRMAN. Suppose you put it this way, Mr. Powers; how many gentlemen wish to be heard?

Mr. POWERS. No more than you desire to hear, Mr. Chairman. We are here to furnish you with the information that you desire to have.

The CHAIRMAN. But you have some idea as to how many would like to be heard.

Mr. POWERS. I look at it that the Congress has imposed upon you the burden of making this investigation. Now, we wish to assist you as much as possible.

Mr. MURDOCK. Apparently we are not going to be able to hear all of these gentlemen. It is now half past 4. Are some of the gentlemen prepared to stay over, Mr. Powers?

Mr. POWERS. Yes; all are prepared to stay over. If you do not care to sit any longer to-night we would be very glad to appear here in the morning, although some of the gentlemen wish to go to New York to-morrow morning if you can hear them at that time.

The CHAIRMAN. We would be glad to have some one go on for about 15 minutes now.

Mr. POWERS. I think it would be well for the commission to determine at this time what investigation they wish to make of our books, whether they want them made in the different cities or whether it is desired to have engineers investigate the plant. It may be that you gentlemen desire to take a view of the plant, possibly in New York City. I would like to arrange all of those things before we complete this series of hearings.

The CHAIRMAN. That could be arranged later by correspondence, possibly.

Mr. POWERS. Very well, Mr. Chairman.

The CHAIRMAN. We would like to adjourn about a quarter to 5, so that we will be able to hear someone now for a few minutes if there is anyone who desires to be heard. It has been suggested, Mr. Powers, that some one representing the financial end of the company be heard now.

Mr. POWERS. Well, the president of the company is here and also Mr. Clapp.

Mr. GILMER CLAPP. If there are any questions you would like to ask me, I would be pleased to answer them, but I think Mr. Hayden

has covered, in a general way, everything that the treasurer could say.

The CHAIRMAN. I do not think there are any further questions that the commission desires to ask on that subject at this time, Mr. Clapp. Senator Smith suggests that one of the engineers be heard now.

The financial statement referred to by Mr. Hayden in his testimony reads as follows:

EXHIBIT A.

POSTAL PNEUMATIC-TUBE COMPANIES.

BOSTON, MASS., *November 15, 1912.*

The following statements are appended:

Schedule A.—Results of operating mail tubes for five years ending March 31, 1908, 1909, 1910, 1911, and 1912.

Schedule B.—Mileage, rentals, costs, and expenses of each company for year ending March 31, 1912.

Schedule C.—Detailed costs and expenses of each company for year ending March 31, 1912.

Schedule D.—Costs and expenses for year ending March 31, 1912, with estimated saving, if tubes were operated under Government ownership.

REMARKS.

Schedule A.—In anticipation of this statement being compared with the figures given in our published report, it should be explained that earnings from miscellaneous sales and income from press lines in Boston which do not constitute a part of the mail-tube system are excluded. It may also be pointed out that the figures published in the company's annual report for the year 1910 showed gross earnings—interest not being deducted.

Schedule B.—The actual mileage of double tubes in operation at March 31, 1912, is shown on this statement. The average mileage on which rental was received for the year was 44.6734.

Schedule C.—This statement gives the costs and expenses for the year ending March 31, 1912, as they appear on our books. The numbers on the right side of the sheet indicate how the items have been grouped in Schedule B.

Schedule D.—This statement shows costs and expenses for the year ending March 31, 1912, together with the estimated saving to be made under Government operation.

The estimated increases and decreases in the costs and expenses may be summarized as follows:

ESTIMATED INCREASES IN COSTS UNDER GOVERNMENT OPERATION.

1. *Labor.*—The companies averaged during the year 153 operators. To operate 20 hours per day on 8-hour shifts instead of 10-hour shifts would require approximately 25 per cent more men. This is equivalent to 191 men, at the average rate the Government pays its laborers, \$720 per year, total labor cost \$137,520, being an increase of \$31,923 a year.

3 and 4. Would probably cost the Government 10 per cent more than private companies to make repairs.

ESTIMATED DECREASES IN COSTS UNDER GOVERNMENT OPERATION.

5. *Steam purchased.*—The Government sells steam to the companies supposedly at cost. This must necessarily be on the safe side. It is therefore assumed that at least 10 per cent can be saved on this item.

7. *Power wages.*—The Government would require approximately 14 men rated as oilers at a salary of \$780 per annum, and in addition one assistant engineer electrician at \$1,400, a total of \$12,320, thus showing a saving of about \$1,400.

10. *Rent, light, and heat.*—This amount will be entirely saved.

11. *Salaries, officers, clerical, etc.*—This item covers salaries of all general officers of the company, including the manager, but does not include the resident superintendent in each city.

If the operation of these systems were, for example, taken over by the chief electrical and mechanical engineer of the Treasury Department, his office and staff could possibly handle same without extra expense. To be conservative, however, \$5,000 is allowed for any extra expenses.

12. *Legal.*—It is assumed that legal services would be provided by legal officers already appointed.

13. *Rent, light, heat, supplies, postage, traveling, etc.*—A saving of \$12,801.73 under this head is estimated as follows:

Postage-----	\$299. 83
Traveling ($\frac{1}{2}$)-----	738. 62
Telephones-----	1, 000. 00
Rent, light, and heat, offices-----	1, 239. 10
Bond premiums, etc-----	6, 007. 80
Directors' fees-----	295. 00
Fines-----	235. 00
Bonuses to employees-----	1, 335. 02
Right of way and yard rent-----	484. 44
Mail teams-----	1, 166. 92
	<hr/>
	\$12,801. 73

14. *Extraordinary expense.*—\$9,094.26 due to changes in pneumatic-tube plants owing to removal of postal stations, etc.

The expenses, insurance, taxes, depreciation, and interest would not occur under Government operation.

SCHEDULE A.—*Postal pneumatic-tube companies.*

	1908	1909	1910	1911	1912
Rentals.....	\$386, 176	\$520, 416	\$655, 912	\$701, 752	\$759, 462
Operating and general expense.....	287, 945	290, 908	350, 787	391, 369	378, 137
Gross profits.....	98, 231	229, 508	305, 125	310, 383	381, 325
Insurance.....	1, 112	1, 538	1, 766	1, 445	2, 540
Taxes.....	10, 729	12, 990	14, 672	21, 295	24, 156
Dcpreciation ¹	38, 370	38, 370	38, 370	38, 370	38, 370
Interest.....	129, 371	142, 625	143, 464	203, 522	221, 451
	179, 582	195, 523	198, 272	264, 632	286, 517
Profit.....	81, 351	33, 985	106, 853	45, 751	94, 808
Dividends.....				50, 000	45, 000
Surplus.....	² 81, 351	33, 985	106, 853	² 4, 249	49, 808

¹ Represents depreciation at 5 per cent on cost of construction of Chicago system only. Franchise with city of Chicago for 20 years, at the end of which the tubes become the property of the city.

² Deficit.

SCHEDULE B.—*Postal pneumatic-tube companies.*

	Boston.	New York.	Chicago.	St. Louis.	Total.
Mileage.....	6. 774	26. 5230	9. 6017	1. 9465	44. 8452
Rentals.....	\$115, 158	\$449, 928	\$161, 286	\$33, 090	\$759, 462

COSTS: YEAR ENDING MAR. 31, 1912.

Operating tubes:					
Labor.....	\$14, 872. 66	\$65, 344. 40	\$21, 573. 06	\$3, 806. 41	\$105, 596. 53 (1)
Inspection.....	2, 811. 79	4, 273. 89	3, 789. 10	1, 680. 64	12, 555. 42 (2)
Repairs:					
Stations and carriers.....	5, 013. 34	26, 318. 31	12, 257. 86	837. 07	44, 426. 58 (3)
Streets.....	546. 66	1, 558. 57	170. 51	357. 87	2, 292. 59 (4)
Power:					
Steam purchased.....	6, 234. 86	26, 603. 10	10, 398. 76	3, 583. 75	46, 820. 47 (5)
Electricity purchased.....	9, 032. 36	68, 349. 30	10, 784. 60	.....	88, 166. 26 (6)
Wages.....	1, 990. 76	7, 367. 45	2, 574. 92	1, 830. 00	13, 763. 13 (7)

SCHEDULE B.—*Postal pneumatic-tube companies*—Continued.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power—Continued.					
Repairs, boilers, etc.....	\$51.27	\$1,520.99	\$1,051.91	\$361.06	\$2,985.23 (8)
Signal wires.....	154.16	709.50	91.70	.....	955.36 (9)
Supplies, etc.....	324.03	2,162.22	329.95	91.42	2,907.62 (10)
General expense:					
Salaries, officers, clerical, etc.....	2,926.58	13,594.00	4,508.21	1,204.86	22,233.65 (11)
Legal.....	.....	3,170.25	75.00	.....	3,245.25 (12)
Rent, light, heat, supplies, postage, stationery, traveling, etc.....	2,675.91	11,733.42	6,461.09	2,224.72	23,095.14 (13)
Extraordinary expense.....	736.85	2,999.16	5,156.84	201.41	9,094.26 (14)
Total.....	47,371.23	235,704.56	78,882.49	16,179.21	378,137.49
Insurance.....	595.32	1,381.84	443.83	119.54	2,540.53
Taxes.....	2,524.39	10,540.48	8,384.66	2,706.11	24,155.64
Depreciation.....	.....	.....	38,370.00	.....	38,370.00
Interest.....	20,266.07	140,227.60	48,907.35	12,049.56	221,450.58
Total.....	23,385.78	152,149.92	96,105.84	14,875.21	286,516.75
Grand total.....	70,757.01	387,854.48	174,988.33	31,054.42	664,654.24

NOTE.—Numbers on right side show how this summary is made up from detailed expense statement shown in Schedule C.

SCHEDULE C.—*Tube companies' expense, year to Mar. 31, 1912.*

	Boston.	New York.	Chicago.	St. Louis.	Total.
General expenses;					
1. Salaries.....	\$2,926.58	\$13,594.00	\$4,508.21	\$1,204.86	\$22,233.65 (11)
2. Postage, printing, etc.....	3.45	142.39	109.49	44.50	299.83
3. Traveling.....	.....	745.50	493.00	238.85	1,477.35
4. Telegraph and telephone.....	534.38	3,740.20	709.21	245.55	5,229.34
5. Rent, light, and heat.....	300.00	239.10	310.00	300.00	1,239.10
6. Legal.....	.....	3,170.25	75.00	.....	3,245.25 (12)
7. Miscellaneous.....	605.60	3,066.09	1,829.16	506.95	6,007.80
8. Directors.....	75.00	165.00	35.00	20.00	295.00
9. Fines.....	2.00	180.00	51.00	2.00	235.00
10. Bonus.....	269.03	752.49	234.68	78.82	1,335.02
Operating;					
11. Labor.....	14,872.66	65,344.40	21,573.06	3,806.41	105,596.53 (1)
12. Supplies.....	108.99	192.34	138.90	89.05	529.28
13. Oil and waste.....	233.82	266.26	428.71	129.30	1,058.09
14. Rent, light, heat, etc.....	.....	7.20	117.24	360.00	484.44
15. Mail and teams.....	124.92	124.00	918.00	.....	1,166.92
16. Drips.....	28.75	562.30	416.09	.....	1,007.14
17. Inspection.....	2,811.79	4,273.89	3,789.10	1,680.64	12,555.42 (2)
18. Repairing tubes and station- ary machinery.....	546.66	1,558.57	170.51	357.87	2,292.59 (4)
19. Repairing terminal machinery.....	248.01	3,165.97	3,138.19	18.11	6,534.06
20. Repairing carriers.....	4,761.40	23,121.90	9,017.34	855.18	37,755.82
21. Repairing building and fix- tures.....	3.93	30.44	102.33	.....	136.70
22. Miscellaneous.....	2.10	153.78	5.77	.....	161.65
23. Carfares, etc.....	168.55	1,122.98	449.95	209.70	1,951.18
24. Extraordinary.....	736.85	2,999.16	3,460.73	201.41	7,398.15
25. Stations, Twenty-second and LaSalle.....	.....	.....	1,696.11	.....	1,696.11
Power:					
26. Steam purchased.....	6,234.86	26,603.10	10,398.76	3,583.75	46,820.47 (5)
27. Electricity purchased.....	9,032.36	68,349.30	10,784.60	.....	88,166.26 (6)
28. Water.....	.....	.....	.53	.....	.53 (10)
29. Boiler room labor.....	.....	.....	.....	10.00	10.00 (7)
30. Engine supplies.....	22.02	81.92	73.93	20.06	197.93 (10)
31. Engine labor.....	1,990.76	7,367.45	2,574.92	1,820.00	13,753.13 (7)
32. Oil, waste, and paper.....	302.01	1,480.30	244.58	71.36	2,098.25 (10)
33. Repairing boilers.....	.99	.....	1.00	.....	1.99
34. Repairing P. P. and air pip- ing.....	50.28	1,520.99	1,007.58	361.06	2,939.91
35. Repairing buildings.....	.....	.....	43.33	.....	43.33
36. Rent, light, and heat.....	.....	600.00	10.91	.....	610.91 (10)
37. Signal wires.....	154.16	709.50	91.70	.....	955.36 (9)
38. Auto.....	219.32	.....	.....	.....	219.32 (13)
39. Repair shop.....	.....	183.79	214.89	.....	398.68 (13)
Total.....	47,371.23	235,704.56	78,882.49	16,179.21	378,137.49

NOTE.—Numbers on right correspond with numbers in Schedule B.

Rental now paid by Government.....	\$759,462
Annual cost under Government ownership:	
Operating expenses.....	\$365,664
Insurance.....	2,540
Taxes.....	None.
Depreciation, Chicago.....	
Interest.....	221,450
	589,654
Annual saving, Government operation.....	169,808
\$170,000=5 per cent on \$3,400,000.	
\$393,000=5 per cent on \$7,860,000.	

SCHEDULE D.—Postal Pneumatic-Tube Co., operating costs and expenses.

	Costs, year 1911-12, per Schedule B.	Estimated changes in these costs if tubes were operated by the Government.		Estimated cost to operate by Government.
		Increase.	Decrease.	
Operating tubes:				
Labor.....	\$105,596.53	\$31,923.00		\$137,519.53 (1)
Inspection.....	12,555.42			12,555.42 (2)
Repairs:				
Stations and carriers.....	44,426.58	4,442.66		48,869.24 (3)
Streets.....	2,292.59	229.26		2,521.85 (4)
Power:				
Steam purchased.....	46,820.47		\$4,682.05	42,138.42 (5)
Electricity purchased.....	88,166.26			88,166.26 (6)
Wages.....	13,763.13		1,400.00	12,363.13 (7)
Repairs, boilers, etc.....	2,985.23			2,985.23 (8)
Signal wires.....	955.36			955.36 (9)
Supplies, etc.....	2,907.62		610.91	2,296.71 (10)
General expense:				
Salaries, superintendents, clerical, etc.....	22,233.65		17,233.65	5,000.00 (11)
Legal.....	3,245.25		3,245.25	(12)
Rent, light, heat, supplies, postage, station- ery, traveling, etc.....	23,095.14		12,801.73	10,293.41 (13)
Extraordinary expense.....	9,094.26		9,094.26	(14)
Total.....	378,137.49	36,594.92	49,067.85 12,472.93	365,664.56
Insurance.....	2,540.53		2,540.53	
Taxes.....	24,155.64		24,155.64	
Depreciation.....	38,370.00		38,370.00	
Interest.....	221,450.58		221,450.58	
Total.....	286,516.75		286,516.75	
Total all expense.....	664,654.24		298,989.68	365,664.56

Total estimated saving in operating costs and expenses under Government ownership.....	\$298,989.68
Total annual rental paid by Government.....	759,462.00
Total annual operating expense.....	365,664.00
Total annual saving under Government operation.....	393,798.00

STATEMENT OF MR. B. C. BATCHELLER, CHIEF ENGINEER OF THE AMERICAN PNEUMATIC SERVICE CO.

Mr. MURDOCK. Will you please start your testimony, Mr. Batcheller, by giving us a history of exterior pneumatic tubes, as you understand it?

Mr. BATCHELLER. The tubes for transportation of the United States mail were constructed in Philadelphia between the general post office and the station then known as the East Chestnut Street Station.

Mr. MURDOCK. That was done, however, without any contract with the United States Government?

Mr. BATCHELLER. There was, I believe, a contract with the Government by which the company operated that tube for one year without compensation. Then for four years it operated that tube for a nominal income of \$3,000 a year, I think, which was not enough to pay the expenses of operation.

Mr. MURDOCK. The original estimates of mechanical efficiency were never maintained; they have never gotten out of these tubes the speed in expediting the mails that they got originally?

Mr. BATCHELLER. The carriers travel through the tubes at a speed of 30 miles an hour, but if a carrier is going from the general post office in New York to One hundred and twenty-fifth Street it has to be redispached at several intermediate stations along the line; for example, at Station A, at Station O, at Station Times Square, at Station G, at Station W, at Station H, at Station I, finally reaching Station J at One hundred and twenty-fifth Street.

Mr. MURDOCK. I interrupted you in your statement of the history of the exterior pneumatic tubes. Please proceed with what you were saying in that regard.

Mr. BATCHELLER. Where the carriers travel at a speed of approximately 30 miles an hour in the tubes, a little time is lost in transferring at the intermediate stations, so that the average rate of speed from the post office to One hundred and twenty-fifth Street is somewhat less than 30 miles an hour. In the report of the commission that made an investigation in 1908 there are some figures given showing the average speed from one point to another in several cities.

Referring again to the history or development of the tubes: Following the operation of the line in Philadelphia between the general post office and East Chestnut Street Station for a period of five years, contracts were made by the Post Office Department for an extension of the tube service in Philadelphia from the general post office to the Reading Railroad Station and the Pennsylvania Railroad Station; for lines in New York City between the general post office and the station then located in the Produce Exchange; another line from the general post office across the Brooklyn Bridge to Brooklyn, and a line from the general post office to Stations D, Madison Square, and the Grand Central. Another contract was made for a line in the city of Boston from the general post office to the North Railway Station. Those lines were constructed and completed about 1898. There was no material extension for several years following that. I have forgotten when the next extensions were built, but I think it was about 1902 or 1903.

Mr. STEWART. If I may interrupt you, Mr. Batcheller, for a moment, I would like to say to the chairman that there is given what is called a brief history of the pneumatic-tube service, 1892 to 1908, on pages 15 and following, in the report of the investigation as to the pneumatic-tube service for the mails, which report was made by a former commission in 1908, and I would suggest that that history be set out in the record at this time to cover all those questions. That gives all the contracts that have been entered into and the conditions under which the contracts were made.

The CHAIRMAN. The history to which you refer, Mr. Stewart, may be inserted in the record at this time.

BRIEF HISTORY OF PNEUMATIC-TUBE MAIL SERVICE, 1892-1908.

The use of pneumatic tubes in the United States for the general transmission of first-class mail is believed to be unique, and it is therefore interesting, as well as valuable, to trace briefly the development of the system.

In foreign countries pneumatic tubes of small diameters (say 2½ to 3 inches) had been used for the transmission of telegrams, and in some instances for the transmission of special-delivery letters or cards. In the United States there were also some instances in commercial business of pneumatic tubes of similar dimensions for like purposes and for comparatively short distances. The first installation of a large tube for postal purposes was made in 1893 in Philadelphia, Pa., this being a 6-inch tube, and it is said that the problems connected with its operation were entirely different from those solved in the use of the tubes of smaller diameter. This 6-inch tube was in operation for about four years before the installation of 8-inch tubes was commenced. There has been a constant employment of inventive ingenuity during the past 15 years to improve the mechanical operation of these larger systems. The chronology of the pneumatic-tube mail service is briefly given as follows:

1892.—Annual report of Postmaster General Wanamaker announces that he was able to secure an item of \$10,000 in the last appropriation bill for experiments with pneumatic tubes, and that in response to advertisements eight proposals were submitted, of which, however, only one proved practicable for immediate testing. The Pneumatic Transit Co. of New Jersey is already putting down tubes in Philadelphia between the general post office and the East Chestnut Street Postal Station, to be completed soon after December 1, 1892. He is informed that the company is at an expense of \$25,000, and the Post Office Department can try the system for one year without expense, and may then rent, purchase, or reject it without incurring any liability.

1893—*March 1*.—Use of Philadelphia 6-inch tube, as above described, commenced this date for the transmission of mail experimentally.

1894—*March 1*.—Commencing this date Post Office Department pays for the use of the Philadelphia tube, the terminus of which has been removed from the East Chestnut Street Station to the Bourse Building. Total distance, 0.55 mile; annual pay, \$4,000. This was reduced, commencing March 1, 1895, to \$3,450 per annum.

1895.—Annual report of Second Assistant Postmaster General intimates that arrangements may soon be feasible for an experimental tube or mechanical appliance between the New York general post office and the Forty-second Street Depot and between New York and Brooklyn. He remarks that this will be very desirable on account of the heavy tonnage between the points named and the present expense of transporting the mails between these points.

1896.—Appropriation bill for fiscal year ended June 30, 1897, in the allowance for "Mail messenger service," provides that a sum not exceeding \$35,000 may be used for the transportation of mails by pneumatic tubes or other similar devices.

Report of Second Assistant Postmaster General states that 24-inch or 36-inch tubes are not practicable on account of construction difficulties and expense, but that a 10-inch tube with 8-inch carriers would relieve the department of 65 to 70 per cent of trips now made by wagons. He remarks that prospects seem favorable for early contracts in New York, Philadelphia, and Boston, and that it is possible that a proposition may be received from New York City for pneumatic-tube service over almost the entire island, in which event he would ask that Congress change the amount of money which is now paid for regulation wagon service in New York City to the pneumatic-tube fund, "as the establishment of the tube service would practically do away with wagon service in New York City." He recommends that \$50,000 be appropriated to succeed the present appropriation of \$35,000.

1897.—The appropriation bill for the year ended June 30, 1898, permits of the expenditure of \$150,000 (out of mail-messenger fund) for transportation of mail by pneumatic tube or other similar device. In pursuance of this, contracts were made for service in Philadelphia, Brooklyn, New York, and Boston, all contracts contemplating 8-inch tubes, carriers to be 6½ by 21 inches, to be dispatched at intervals of six seconds. The Second Assistant Postmaster General estimates that each carrier will hold about 600 ordinary letters, making a capacity of 360,000 per hour each way.

October 15. New York, N. Y.—Tube service began this date, general post office to Station P, 0.7 mile.

December 20. Boston, Mass.—Tube service began this date from general post office to North Union Station, 0.74 mile.

1898—February 26. New York, N. Y.—Tube service began this date, general post office to Station P, 0.7 mile.

March 10. Philadelphia, Pa.—Contract made this date for renewal of service on 6-inch line, general post office to Bourse Station, 0.52 mile, at \$17,600 per annum.

April 7. Philadelphia, Pa.—General post office to Broad Street Station tube service commenced this date, 0.94 mile, \$16,966 per annum. Reading Terminal not yet connected.

August 1. Brooklyn, N. Y.—Tube service began this date between New York general post office and Brooklyn general post office, 1.65 miles.

Pneumatic-tube service in operation Aug. 1, 1898.

City.	Termini.	Length.	Annual rate.	Rate per mile.
		Miles.		
Boston, Mass.....	General post office to North Union Station...	0.74	¹ \$17,055.00	\$23,047
	New York general post office to Brooklyn general post office.	1.65	² 20,200.00	12,242
New York, N. Y.....	General post office to Station P.....	4.20	³ 176,099.70	41,928
	General post office to Stations D, Madison Square, and F to H.			
	General post office to Bourse Station.....			
Philadelphia, Pa.....	General post office via Reading terminal to Broad Street Station.	.52	⁴ 17,965.00	34,548
		.94	16,966.00	18,048
Total.....		8.05	248,285.70	30,842

¹ Includes steam power, \$8,055.
² Includes labor, \$6,200.
³ Includes labor, \$10,000; steam power, \$15,044.70; and 2 engineers, \$2,555.
⁴ Includes steam power

The post-office appropriation bill for the year ended June 30, 1899, prohibited any new contracts for pneumatic-tube service. (This prohibition continued until June 30, 1901.)

1899 to 1901.—

Pneumatic-tube service in operation June 30, 1899, 1900, and 1901.

City.	Termini.	Length.	Annual rate.	Rate per mile.
		Miles.		
Boston, Mass.....	General post office to North Union Station..	0.74	\$9,000	\$12,162
	New York general post office to Brooklyn general post office.	1.65	¹ 20,200	12,242
New York, N. Y.....	General post office to Station P.....	4.20	² 158,500	37,738
	General post office to Stations D, Madison Square, and F to H.			
	General post office to Bourse Station.....			
Philadelphia, Pa.....	General post office via Reading terminal to Broad Street Station.	.52	17,600	33,846
		.94	16,966	18,048
Total.....		8.05	222,266	27,610

¹ Includes \$6,200 for labor. ² Includes \$10,000 for labor.

Congress omitted to make any appropriation for pneumatic-tube service for the fiscal year ended June 30, 1902, hence all of this service was discontinued and the tubes not operated from July 1, 1901, to June 30, 1902, inclusive. In lieu of an appropriation Congress directed an investigation by the Postmaster General as to the cost of construction and operation and the utility of a system of pneumatic tubes, etc., to enable Congress to determine whether to own, lease, extend, or discontinue.

RECOMMENDATIONS BY COMMITTEE OF EXPERTS, 1901.

1901—*January 4*.—Report this date by Postmaster General to Congress, as directed, representing an investigation of the pneumatic-tube service by local postal officials, this result being revised by a general committee of postal officials, and this result finally passed upon by a commission of seven outside experts representing men of high commercial and engineering ability. The final committee of experts presented a number of positive conclusions, among which the following are the most important:

1. They found the new method of mail transportation to be a valuable and mechanically successful system, practically adapted in an admirable manner to the purposes of the Post Office Department and of great advantage to the business interests of the country in facilitating mail transmission.

2. They believed that the cost of pneumatic service could be reduced somewhat, and very considerably reduced with the further progress of improvement.

3. They declared that ownership by the Government is considered desirable whenever the systems adopted have passed the experimental stage.

4. As regards renewing contracts or making new contracts they suggest that an option of later acquirement be included and that such acquirement be by appraisal by experts of all property and all patent rights applicable to the contract, or at a stated figure.

5. They advised the retention of all previously established pneumatic-tube service in Boston, New York (including the New York and Brooklyn line), and Philadelphia, 8.05 miles; and recommend the following additional mileage:

	Miles.
New York City-----	18.00
Chicago-----	8.78
Philadelphia-----	6.19
Boston-----	.70
St. Louis-----	3.16
Total-----	36.83

This making a grand total of both old and new service of about 44.88 miles.

LAW OF APRIL 21, 1902.

1902—*April 21*.—The Post Office appropriation bill approved this date for the year ended June 30, 1903, contained the following provision:

“For the transmission of mail by pneumatic tubes or other similar devices, \$500,000, or so much thereof as may be necessary; and the Postmaster General is hereby authorized to enter into contracts for a period not exceeding four years, after public advertisement once a week for a period of six consecutive weeks in not less than five newspapers, one of which shall be published in each city where the service is to be performed. That the contracts for this service shall be subject to the provisions of the postal laws and regulations relating to the letting of mail contracts, except as herein otherwise provided, and that no advertisement shall issue until after a careful investigation shall have been made as to the needs and practicability of such service and until a favorable report, in writing, shall have been submitted to the Postmaster General by a commission of not less than three expert postal officials, to be named by him; nor shall such advertisement issue until in the judgment of the Postmaster General the needs of the postal service are such as to justify the expenditure involved. Advertisements shall state in general terms only the requirements of the service and in form best calculated to invite competitive bidding.

“That the Postmaster General shall have the right to reject any and all bids; that no contract shall be awarded except to the lowest responsible bidder, tendering full and sufficient guaranties, to the satisfaction of the Postmaster General, of his ability to perform satisfactory service, and such guaranties shall include an approved bond in double the amount of the bid.

“That no contract shall be entered into in any city for the character of mail service herein provided which will create an aggregate annual rate of expenditure, including necessary power and labor to operate the tubes, and all other

expenses of such service in excess of 4 per cent of the gross postal revenues of said city for the last preceding fiscal year.

"That no contract shall be made in any city providing for 3 miles or more of double lines of tube which shall involve an expenditure in excess of \$17,000 per mile per annum, and said compensation shall cover power, labor, and all operating expenses.

"That the Postmaster General shall not, prior to June 30, 1904, enter into contracts under the provisions of this act involving an annual expenditure in the aggregate in excess of \$800,000; and thereafter only such contracts shall be made as may from time to time be provided for in the annual appropriation act for the postal service; and all provisions of law contrary to those herein contained are repealed."

Under this act contracts were made for service covering mileage of double lines of tubes in cities as follows:

	Miles.
Boston -----	5.44
New York -----	24.653
Philadelphia -----	7.642
Chicago -----	8.70
St. Louis -----	3.16
Total -----	49.595

1903.—During this fiscal year pneumatic-tube service was resumed in Boston, New York, and Philadelphia (8.05 miles), and extended so that on June 30, 1903, there was an aggregate in the three cities in operation of 12.495 miles.

1904.—Congress, in Post Office appropriation bill approved March 3, 1903, appropriated "for transmission of mail by pneumatic tubes or other similar devices, \$800,000."

RECOMMENDATIONS OF COMMITTEE OF 1905.

1905.—Congress, in Post Office appropriation bill approved April 23, 1904, appropriated "for transmission of mail by pneumatic tubes or other similar devices, \$500,000, from which sum may be paid amount necessary to fulfill the existing contract for service in Boston."

Under date of October 4, 1905, a commission of three expert postal officials, appointed by Postmaster General's order of November 15, 1904, to carefully investigate the needs and advisability of extending the pneumatic-tube service, submitted its report with the following recommendations for additional mileage:

City.	In operation Oct. 1, 1905.	Additional recommended.	Total.
	Miles.	Miles.	Miles.
Baltimore, Md. ....	.....	2.06	2.06
Boston, Mass.	6.89	.....	6.89
Brooklyn, N. Y. ....	.....	3.94	3.94
Chicago, Ill.	8.88	8.814	17.694
Cincinnati, Ohio. ....	.....	2.290	2.29
Kansas City, Mo. ....	.....	2.280	2.28
New York, N. Y.	6.853	18.61	25.463
Philadelphia, Pa.	1.382	6.242	7.624
Pittsburgh, Pa. ....	.....	1.90	1.90
St. Louis, Mo.	2.09	1.25	3.34
San Francisco, Cal. ....	.....	1.62	1.62
Total.	26.095	49.006	75.101

1906.—Congress, in Post Office appropriation bill approved March 3, 1905, for the fiscal year ended June 30, 1906, appropriated "for transmission of mail by pneumatic tubes or other similar devices, \$500,000."

1907.—Congress, in Post Office appropriation bill approved June 26, 1906, for the fiscal year ended June 30, 1907, appropriated "for the transmission of mail by pneumatic tubes or other similar devices, \$900,000, and the Postmaster General is hereby authorized to enter into contracts not exceeding in the

aggregate \$1,250,000 under the provisions of law, for a period not exceeding 10 years: *Provided*, That said service shall not be extended in any cities other than those in which the service is now under contract under authority of Congress, except the Borough of Brooklyn of the city of New York, and the cities of Baltimore, Md.; Cincinnati, Ohio; Kansas City, Mo.; Pittsburgh, Pa., and San Francisco, Cal.”

1908.—Congress, in Post Office appropriation bill approved March 2, 1907, appropriated “for the transmission of mail by pneumatic tubes or other similar devices, \$1,250,000, and the Postmaster General is hereby authorized to enter into contracts not exceeding in the aggregate \$1,388,759 under the provisions of the law for a period not exceeding 10 years: *Provided*, That said service shall not be extended in any cities other than those in which the service is now under contract under the authority of Congress, except the Borough of Brooklyn of the city of New York, and the cities of Baltimore, Md.; Cincinnati, Ohio; Kansas City, Mo.; Pittsburgh, Pa., and San Francisco, Cal.”

1909.—Congress, in the Post Office appropriation bill approved May 27, 1908, for the fiscal year ended June 30, 1909, provides “for the transmission of mail by pneumatic tubes or other similar devices, \$1,000,000; and the Postmaster General is hereby authorized to enter into contracts not exceeding in the aggregate \$1,388,759 under the provisions of the law for a period not exceeding 10 years.”

The extent of pneumatic-tube service in operation on June 30 in each year from 1893 to 1908 is briefly set forth in the following table:

Growth of pneumatic-tube service, 1893–1908.

Fiscal year ending June 30—	Pneumatic-tube service in operation, etc., in—						Total length.	Total pay per annum.	Rate per mile.
	Philadel- phia.	Boston.	New York.	Chicago.	St. Louis.	Brook- lyn.			
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.		
1893.....	(1)						0.55		
1894.....	0.55						.55	\$4,000	\$7,272
1895.....	.55						.55	3,450	6,200
1896.....	.55						.55	3,450	6,200
1897.....	.55						.55	3,450	6,200
1898.....	1.46	0.74	5.85				8.05	232,085	28,830
1899.....	1.46	.74	5.85				8.05	222,266	27,610
1900.....	1.46	.74	5.85				8.05	222,266	27,610
1901.....	1.46	.74	5.85				8.05	222,266	27,610
1902.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
1903.....	1.382	4.26	6.853				12.495	201,095	16,094
1904.....	1.382	6.89	6.853				15.125	218,470	14,444
1905.....	1.382	6.89	6.853	8.88	2.09		26.095	401,023	15,367
1906.....	4.002	6.89	6.853	8.88	2.09		28.715	445,563	15,516
1907.....	3.9	6.652	7	7.31	1.68		26.542	451,219	17,000
1908.....	6.022	6.652	9.3998	7.41	1.85		31.3338	532,679	17,000

1 Mar. 1, general post office to East Chestnut Street Station (experimental).
2 No appropriation; all service discontinued.

1908 extensions:	Miles.
Brooklyn, Aug. 14, general post office to Station L.....	1.35
New York—	
July 15, Station O to Station E.....	1.1704
Sept. 21, Station E to Times Square.....	1.1739
Oct. 3, Times Square to Station G.....	1.1719
Nov. 6, Station G to Station N.....	1.4351
Nov. 6, Station N to Station W.....	.9635
Nov. 6, Station W to Station J.....	2.6174
Nov. 6, Station J to Station L.....	.9522
Nov. 9, general post office to Hudson Terminal.....	.4214
Totals for 1908: Length, 42.5896 miles; pay per annum, \$724,023; rate per mile, \$17,000.	

MILEAGE CONTRACTED FOR AND UNDER OPERATION NOVEMBER 10, 1908.

The appropriation for the current fiscal year is \$1,000,000 and contracts are permitted for a total of \$1,388,759. The service in operation November 10, 1908, represents an approximate annual rate of \$724,028. The service con-

tracted for represents an annual rate of about \$1,089,171.09. The details are shown approximately in the following table:

City.	Contractor.	Total service contracted for.		Total service in operation Nov. 10, 1908.		Yet to be built.
		Length.	Annual pay.	Length.	Annual pay.	
		<i>Miles.</i>		<i>Miles.</i>		<i>Miles.</i>
Boston.....	Boston Pneumatic Transit Co.	6.652	\$113,089.14	6.652	\$113,089.14	.....
New York.....	New York Pneumatic Service Co.	27.51	464,270.00	19.3056	528,195.20	8.0044
Brooklyn.....	do.....	1.35	22,950.00	1.35	22,950.00	.....
Philadelphia.....	Pneumatic Transit Co.	8.21	139,570.00	6.022	102,374.00	2.188
Chicago.....	Chicago Postal Pneumatic Tube Co.	17.563	294,470.80	7.41	125,970.00	10.153
St. Louis.....	St. Louis Pneumatic Tube Co.	3.47	54,821.15	1.85	31,450.00	1.62
Total.....	.....	64.555	1,089,171.09	42.5896	724,028.34	21.9654

Although Congress authorized contracts for tube service in Baltimore, Md.; Cincinnati, Ohio; Kansas City, Mo.; Pittsburgh, Pa.; and San Francisco, Cal., no proposals were received by the department for service in those cities in response to the advertisement.

In the city of Philadelphia, although the mileage contracted for, as recognized by orders issued by the department, is 7.35, there is an additional extension between Southwark Station to Station D, 0.8637 mile, which, with the line between the general post office and Southwark Station now in operation, make the total mileage contracted for 8.2137. In addition to this another extension has been recommended by a committee of three postal experts in July, 1908, from Station O via Fairhill Station to North Philadelphia Postal Station, a distance of about 1.72 miles; but contract has not been made for this last extension, the company not yet having agreed to it. This additional service, if contracted for, would raise the total mileage in Philadelphia to about 9.9337.

In the city of Chicago the mileage not yet built (10.153) includes the line out of use between the general post office and Kinzie Station (1.77 miles).

Mr. MURDOCK. As this system developed into various cities through the years from 1892 on, was there any material change in the method of transmitting this mail through the tubes? Did you enlarge the tubes?

Mr. BATCHELLER. The first line built in Philadelphia from the general post office to the East Chestnut Street Station was 6½ inches internal diameter. The extensions which followed that were 8½ inches diameter.

Mr. MURDOCK. Did you ever go above 8½ inches in size?

Mr. BATCHELLER. There is a small amount of tube in Boston 10 inches in diameter. It was originally built for the transmission of parcels, for commercial business.

Mr. MURDOCK. Is it serviceable?

Mr. BATCHELLER. That was converted into a mail system and is serviceable.

Mr. MURDOCK. Then why should the standard type be fixed at 8½ or 8¼ inches if you can make a 10-inch tube work?

Mr. BATCHELLER. It was decided back in 1897 that an 8-inch tube would be the most efficient size. Of course you can see the advantage of having uniformity in the tubes. It enables the carriers to be transferred from one line to another.

Mr. MURDOCK. What I am trying to arrive at is this: Where is the mechanical advantage in an 8-inch tube as against the 10-inch tube?

Mr. BATCHELLER. That is a question that requires a great deal of consideration. If the tube is too small you can not transport all of the mail. On the other hand, if the tube is too large, there would be a great deal of the time when it would not be used, and its cost of construction would be greater. You must therefore decide upon an economical size; a size that is large enough to transport the mail, and at the same time will be used somewhere near its capacity during the busy hours of the day. If its capacity is much larger than necessary, then you have your tube standing idle for a larger portion of the time.

Mr. MURDOCK. Do you mean to say that they would be busy a less portion of the day with the 10-inch tube?

Mr. BATCHELLER. If they were larger than they are now there would be a greater portion of the time that they would not be used to their maximum capacity. You must remember that the tubes are intended to expedite first-class mail, individual letters, as well as quantities of letters. Letters with special-delivery stamps on them are sent immediately. If there is no other mail to go a single letter is dispatched. It is most economical to have the carrier as near the size of the parcel to be sent as practicable. If a tube of 30 inches in diameter were to be used, and you wanted to send a single letter, you would have to dispatch it in a large car, which would obviously be uneconomical.

Senator SMITH. It would be more practical to have a size tube that would accommodate the business and escape the expense.

Mr. BATCHELLER. The smaller the tube the more readily and quickly can the carriers be handled and dispatched. The quantity of mail dispatched from stations is often small. It is sufficient to fill, for example, a 30-inch carrier, whereas several 8-inch carriers will carry it.

Senator SMITH. Have you been in close touch with the operation of these tubes and the service being rendered to the Government?

Mr. BATCHELLER. I have been closely identified with the business from the very beginning.

Senator SMITH. Do you still believe that an 8-inch tube is practically the best selection in size?

Mr. BATCHELLER. I believe that an 8-inch tube is for most places the most efficient size of tube to use, particularly for connection to the postal stations, but there are undoubtedly places where a larger tube would be more advantageous. For example, between two railway stations in a large city where there is a considerable amount of transit mail. In that case it might be more economical to have a tube large enough to carry the mail in sack. There are probably some cases, where the general post office is a considerable distance from the railway station, where it would be advantageous to have a larger tube between them, but for the postal stations or branch post offices I believe that an 8-inch tube is the most efficient size.

Mr. MURDOCK. The unit of shipment in the mail is a sack. It is not a letter, but a pouch of letters. As an engineer, do you think that it is impossible in the future that we may have a tube that will carry a sack?

Mr. BATCHELLER. We have recently built a tube large enough to carry several sacks. It is located in Cambridge, and its operation was witnessed by Mr. Stewart only recently.

The CHAIRMAN. Will it be a success?

Mr. BATCHELLER. Entirely so, I think I can say. The line is about a third of a mile long. We put up a building for a station and then laid the line with short curves of 50 feet radius, ascending and descending grades of 5 per cent, representing the worst conditions that would probably be met with in laying a line in the streets of our large cities. It has now been in operation for several weeks, and from the time the first dispatch was made its operation has been entirely satisfactory.

Mr. MURDOCK. Then the standard tube of 8-inch is standard only as relates to first-class mail sent separately?

Mr. BATCHELLER. The larger tube will supplement, not supplant, the 8-inch tubes. The 8-inch tubes will probably be used to connect the postal stations, and the larger tubes the post office to the railway stations.

Mr. MURDOCK. Have you examined the tubes abroad, especially those in Paris?

Mr. BATCHELLER. Yes, sir; I have.

Mr. MURDOCK. What is the size of the Paris tubes?

Mr. BATCHELLER. The largest are about 3 inches in diameter.

Mr. MURDOCK. And they confine the use of tubes in Paris entirely to telegrams?

Mr. BATCHELLER. Yes; or little special letters, written on a special form.

Mr. MURDOCK. Are the tubes owned by the Government?

Mr. BATCHELLER. I think they are.

The CHAIRMAN. It is really a special-delivery letter used there, and I have often received them. Are there any other cities abroad, Mr. Batcheller, using such tubes?

Mr. BATCHELLER. London has quite an extensive system of tubes $2\frac{1}{4}$ and 3 inches in diameter. They are used for forwarding telegrams.

The CHAIRMAN. How about Berlin and Vienna?

Mr. BATCHELLER. Berlin has an extensive system of tubes, none of which is larger than 3 inches in diameter, and they are used, I believe, for forwarding special-delivery letters.

The CHAIRMAN. Are the tubes mentioned by you controlled entirely by the Governments abroad?

Mr. BATCHELLER. Yes, sir. I was given an opportunity several years ago by the Government officials in Paris, Berlin, and London to inspect them.

The CHAIRMAN. The system is very good in Paris.

Mr. BATCHELLER. It is for telegrams or special letters, but in none of the cities abroad do they undertake to transport the regular letter mail by pneumatic tubes.

Senator SMITH. What is their system? I do not mean as to the tubes, but what is their system as to handling the mail?

Mr. BATCHELLER. By horses and carts or wagons.

Senator SMITH. They rely exclusively on that?

Mr. BATCHELLER. I think so. They may have recently adopted automobiles to some extent, but of that I have no knowledge.

Senator SMITH. It is a private conveyance?

Mr. BATCHELLER. Yes, sir.

Mr. STEWART. Is not the English Government now looking toward a contract for a car of some kind to run underground?

Mr. BATCHELLER. I have been told that they were, but I have no direct knowledge of the subject. I believe no contract has been made and no construction begun.

The CHAIRMAN. I have some questions to ask, but I would rather they go over until to-morrow.

STATEMENT OF MR. F. M. DELANO.

The CHAIRMAN. Whom do you represent, Mr. Delano?

Mr. DELANO. The International Pneumatic Tube Co., which owns the Philadelphia system, which is operated separately from the American Tube Co.

Mr. POWERS. You will recall, Mr. Chairman, that I referred to Mr. Delano by saying that we represented all the plants except the Philadelphia plant, which is represented by Mr. Delano.

Mr. DELANO. Mr. Hayden has given you quite a long address from a financial standpoint of why they desire to sell the tubes to the Government. The reasons are the same with our company. In other words, with a 10-year contract it is impossible to finance new issues of stock and sell them. We would like the opportunity to make an offer of our company to your commission before you finally adjourn. I am not prepared at this moment to give any facts or figures, but I will see that some one is here from New York that can make a tender to you.

Mr. MURDOCK. The Philadelphia Co. was the first one to construct pneumatic tubes?

Mr. DELANO. Yes.

Mr. MURDOCK. Do you remember whether the first construction was done without any arrangement with the Government?

Mr. DELANO. I was not connected with the company at that time.

Mr. MURDOCK. My recollection is that the first construction in Philadelphia was done without any previous arrangement with the Government; that after the construction of the tubes an arrangement was gone into with the department for an annual rental of some \$3,000 a year, which was entirely inadequate; that later it was jumped to \$10,000 and then took the present rental of \$17,000. Do you say that the present rental of \$17,000 is entirely inadequate?

Mr. DELANO. It is entirely inadequate.

The CHAIRMAN. When does your contract expire with the Government?

Mr. DELANO. That I could not say.

Senator SMITH. Who will own it at the end of 10 years, if you are going to get back your property and the interest on your property during that time?

Mr. DELANO. Suppose the Government failed to renew its contract? Those tubes are built between two particular stations and can be used only by the Government for the transportation of mail. We might not be able to put it to any commercial use.

Senator SMITH. If your plant, though, was leased to the Government, which would pay interest on your investment and return your property at the end of the lease, then your contract ought to provide that the Government would own it at the end of the lease.

Mr. DELANO. Yes; if it provided all those things on the principle of the New York subway, which provides that at the end of 15 years the city shall own the subway.

The CHAIRMAN. You would be satisfied if you had a 15-year contract?

Mr. DELANO. If we had a 15-year contract and got back our property and a fair return on the money, then the Government owns the tubes at that time.

Mr. MURDOCK. What annual rental would pay and amortize the Philadelphia Co.?

Mr. DELANO. I could not tell you without figuring that out. I am not thoroughly familiar with all the figures.

Mr. MURDOCK. Your \$17,000 annual rental pays you an interest to-day?

Mr. DELANO. Yes.

Mr. MURDOCK. What interest?

Mr. DELANO. I think it works out about 6 per cent on the amount of money involved. I could not tell you the exact figures.

Mr. MURDOCK. As an investor, what deterioration do you see in your property?

Mr. DELANO. You must maintain a tube of that kind in the best of order to do the service, and out of the charges the tube is maintained. It is like a street railway company; the tracks are kept up and replaced from year to year, and at the end of 10 years it ought to be in proper condition as it was when it started, provided proper maintenance charges were set aside to take care of it.

Mr. MURDOCK. Are you prepared to give to the stenographer for the commission a financial statement of your company?

Mr. DELANO. I am not to-day.

Mr. MURDOCK. Will you do that later?

Mr. DELANO. I shall be glad to do so.

Mr. MURDOCK. I wish you would, please, because we want that information; a good deal on the line followed by Mr. Hayden to-day.

Mr. DELANO. I believe that I stated that we kept our tubes in repair from year to year and replaced anything that needed repairing. There is practically nothing that needs repairing outside of keeping the property up in good condition. I could not testify as to that point, because I am not an engineer, and have nothing to do with the practical operation of the company. There is, however, no wear and tear on the tubes.

The CHAIRMAN. What is your position with the company?

Mr. DELANO. I am interested in the company and I am a director of the company, but I never have had anything to do with the actual operation of the company.

The CHAIRMAN. The reason I asked the question was this: We may at some time wish to send for some one to give us certain information. In such an event, for whom should we send?

Mr. DELANO. One of the officers of the company, possibly the president, or some one of the gentlemen in Philadelphia.

The CHAIRMAN. Will you kindly write us a letter, giving the names of such gentlemen as it would be well to call, so that we may have that information in case it is necessary?

Mr. DELANO. I will be glad to do so.

The CHAIRMAN. I mean particularly some one in charge of the operations and finances.

Mr. DELANO. Yes, sir; and one with authority to talk, I suppose.

The CHAIRMAN. Yes; if you will submit such a letter, we will appreciate it.

Mr. DELANO. I shall be glad to do so.

Thereupon, at 5 o'clock p. m., the commission adjourned until 10 o'clock a. m., December 3, 1912.

**LIST OF PATENTS AND COPIES OF FRANCHISES OF THE AMERICAN
PNEUMATIC SERVICE CO.**

POST OFFICE DEPARTMENT,
SECOND ASSISTANT POSTMASTER GENERAL,
Washington, December 9, 1912.

HON. SIMON GUGGENHEIM,

Chairman Pneumatic Tube Commission, United States Senate.

SIR: I hand you herewith letter from William H. Ames, president of the American Pneumatic Service Co., transmitting list of patents and copy of letter from the company's patent attorney and copies of franchises in the various cities where their tube plants are installed. These were submitted to me in response to a request which I made at the recent hearings.

Very respectfully,

JOSEPH STEWART,
Second Assistant Postmaster General.

AMERICAN PNEUMATIC SERVICE CO.,
Boston, December 5, 1912.

HON. JOSEPH STEWART,

Second Assistant Postmaster General, Washington, D. C.

SIR: In accordance with your request, I herewith inclose a list of our patents, a copy of letter from our patent attorney, and copies of our franchises in the various cities where our tube plants are installed.

If there is any other information I can give you or the commission I shall be pleased to furnish it.

Respectfully,

WM. H. AMES, *President.*

The patents of the American Pneumatic Service Co. are set out in the following lists:


By an instrument of December 24, 1907, the New York Pneumatic Service Co. acquired from the American Pneumatic Service Co. all right, title, and interest under the following patents (and all others hereafter owned or controlled) for the city of New York.

By an instrument of March 25, 1903, the Chicago Postal Pneumatic Tube Co. acquired from the American Pneumatic Service Co. all right, title, and interest under the following patents (and all others hereafter owned or controlled) for the State of Illinois:

	No.	Date.	Description.
Fordyce.....	627181	June 20, 1899	Pneumatic carrier.
Do.....	635434	Oct. 24, 1899	Terminal for pneumatic tubes.
Townsend.....	654690	July 31, 1900	Pneumatic dispatch tube.
Fordyce.....	666747	Jan. 29, 1901	Carrier for pneumatic dispatch tubes.
Johnson.....	681057	Aug. 20, 1901	Pneumatic tube apparatus.
Cowley.....	683022	Sept. 24, 1901	Pneumatic dispatch tube apparatus.
Pike.....	683140	.....do.....	Terminal for pneumatic dispatch tube apparatus.
Do.....	683141	.....do.....	Terminal for pneumatic dispatch.
Cowley.....	683387	.....do.....	Pneumatic dispatch tube apparatus.

FEB. 1ST, 1911.

Scale: 1 in. = 2500 ft.

Note:
— indicates 2-8" Pneumatic Tubes.
Power Station shown thus 

O-A 57.

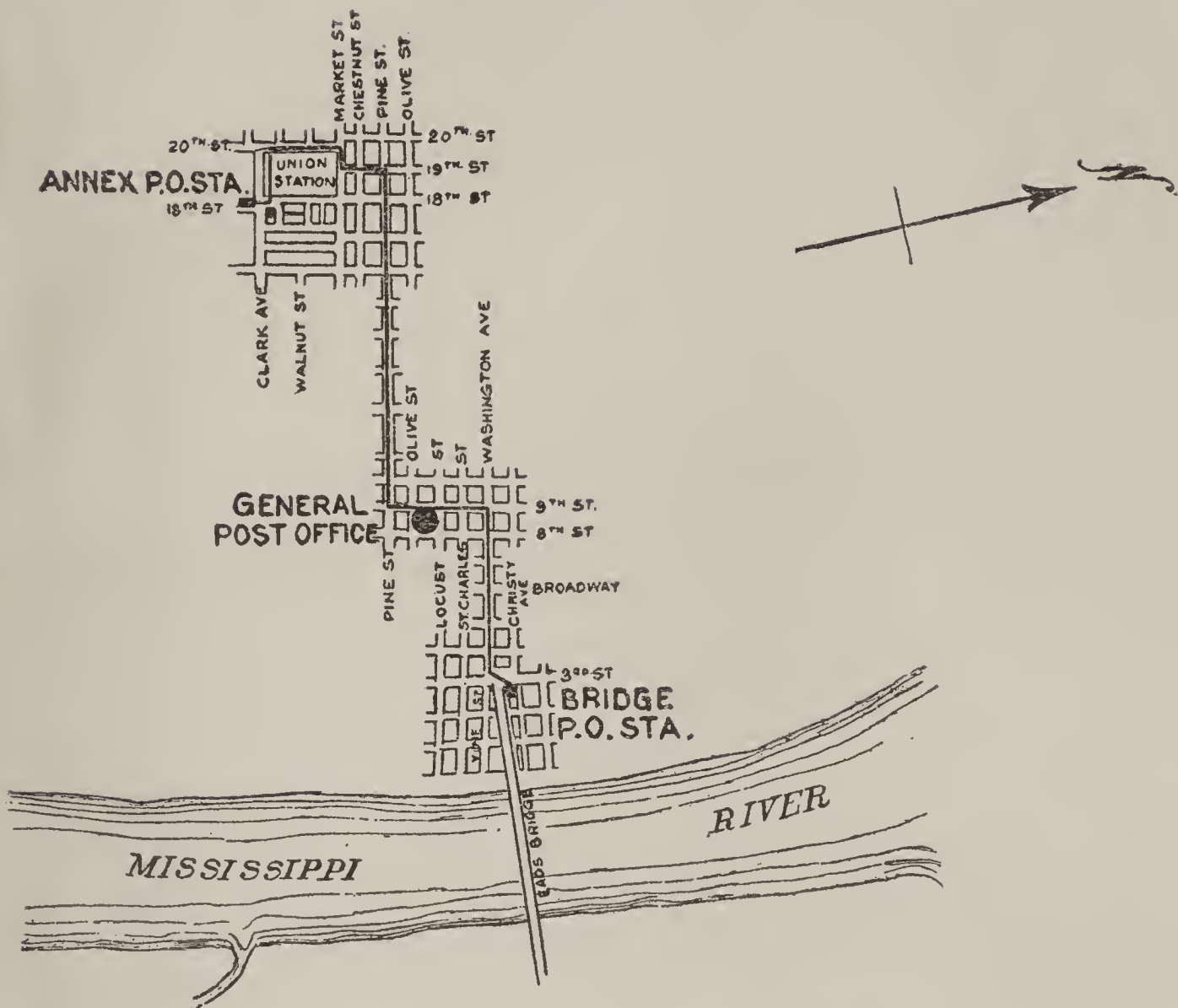


NOTE:
— INDICATES TWO PNEUMATIC TUBES
- - - INDICATES LINES UNDER CONSTRUCTION
● INDICATES POWER STATION.

PLAN OF SYSTEM
OF
CHICAGO POSTAL PNEUMATIC TUBE CO.

FEB. 1st, 1911.
SCALE: 1 INCH = 2400 FT.
REVISED JAN. 10, 1912

EXHIBIT D.



NOTE:
 ——— INDICATES TWO PNEUMATIC TUBES.
 (■) INDICATES POWER STATION

PLAN OF SYSTEM OF ST. LOUIS PNEUMATIC TUBE CO.

FEB. 1ST 1911.

SCALE 1 INCH = 2400 FT.

78419—13. (To face page 34.) No. 3



PLAN OF SYSTEM
OF
BOSTON PNEUMATIC TRANSIT CO.

FEB. 1ST, 1911.
SCALE: 1 INCH = 2400 FT.

NOTE
— INDICATES TWO PNEUMATIC TUBES.
● INDICATES POWER STATION.



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NOTICE TO THE PUBLIC
THE DISTRICT OF COLUMBIA
1877

	No.	Date.	Description.
Pike.....	684715	Oct. 15, 1901	Complete pneumatic dispatch tube terminals.
Cowley.....	685674	Oct. 29, 1901	Transmitter for use in pneumatic dispatch tube apparatus.
Fordyce.....	689043	Dec. 17, 1901	Pneumatic dispatch tube system.
Do.....	698830	Apr. 29, 1902	Pneumatic dispatch apparatus.
Forslund.....	701869	June 10, 1902	Pneumatic dispatch tubes.
Danley.....	703120	June 24, 1902	Pneumatic carrier system.
Cowley.....	706639	Aug. 12, 1902	Pneumatic dispatch apparatus.
Burton.....	722562	Mar. 10, 1903	Carrier for pneumatic dispatch tube apparatus.
Do.....	726022	Apr. 21, 1903	Pneumatic carrier.
Blanchard.....	726017	.....do.....	Lock for pneumatic dispatch tube carriers.
Pike.....	726097	.....do.....	Pneumatic carrier.
Stoddard.....	742513	Oct. 27, 1903	Pneumatic dispatch apparatus.
Do.....	742514	.....do.....	Do.
Do.....	742515	.....do.....	Do.
Do.....	742516	.....do.....	Do.
Do.....	742517	.....do.....	Do.
Burton.....	742390	.....do.....	Pneumatic carrier.
Stoddard.....	758569	Apr. 26, 1904	Pneumatic dispatch apparatus.
Do.....	760658	May 24, 1904	Circuit breaker.
Do.....	760659	.....do.....	Pneumatic dispatch apparatus.
Burton.....	760680	.....do.....	Pneumatic carrier.
Pike.....	760701	.....do.....	Do.
Burton.....	768030	Aug. 23, 1904	Do.
Do.....	768031	.....do.....	Pneumatic dispatch apparatus.
Stoddard.....	772973	Oct. 25, 1904	Do.
Do.....	775949	Nov. 29, 1904	Do.
Burton.....	779638	Jan. 10, 1905	Carrier for pneumatic dispatch apparatus.
Do.....	780595	Jan. 24, 1905	Do.
Do.....	782106	Feb. 7, 1905	Pneumatic carrier.
Stoddard.....	783151	Feb. 21, 1905	Pneumatic dispatch apparatus.
Pike.....	784225	Mar. 7, 1905	Do.
Do.....	790456	May 23, 1905	Pneumatic dispatch tubes.
Do.....	790457	.....do.....	Do.
Stoddard.....	796263	Aug. 1, 1905	Carrier for pneumatic dispatch tube apparatus.
Do.....	800884	Oct. 3, 1905	Pneumatic dispatch apparatus.
Do.....	805168	Nov. 21, 1905	Do.
Do.....	842352	Jan. 29, 1907	Carriers for pneumatic dispatch apparatus.
Do.....	842353	.....do.....	Pneumatic dispatch apparatus.
Do.....	842354	.....do.....	Carriers.
Do.....	842355	.....do.....	Do.
Do.....	869337	Oct. 29, 1907	Pneumatic dispatch tube apparatus.
Do.....	869338	.....do.....	Do.
Do.....	880595	Mar. 3, 1908	Do.
Do.....	886402	May 5, 1908	Cushioning devices for pistons.
Stoddard.....	662771	Nov. 27, 1900	Pneumatic dispatch apparatus.
Cowley.....	648853	May 1, 1900	Pneumatic tubes.
Bogardus.....	661363	Nov. 6, 1900	Draining mechanism for tubular dispatch systems.
Do.....	669886	Mar. 12, 1901	Tubular dispatch apparatus.
Do.....	669887	.....do.....	Receiving mechanism for tubular dispatch system.
Do.....	669888	.....do.....	Do.
Do.....	669889	.....do.....	Pneumatic transit apparatus.
Do.....	669890	.....do.....	Carrier for tubular dispatch systems.
Do.....	669891	.....do.....	Receiving apparatus for tubular transit system.
Do.....	669892	.....do.....	Tubular transit apparatus.
Blood.....	690920	Jan. 14, 1902	Do.
Do.....	711196	Oct. 14, 1902	Sending apparatus for tubular dispatch system.
Do.....	693366	Feb. 18, 1902	Receiving apparatus for pneumatic dispatch apparatus.

Under the 11 Blood and Bogardus patents the American Pneumatic Service Co. owns all rights, except for the State of New York.

In New York City the New York Pneumatic Service Co. (assignee of the Tubular Dispatch Co.) has a license. In the State of New York (except New York City) the New York Mail & Newspaper Transportation Co. has a license.

	No.	Date.	Description.
Bogardus, Collis, and Powell.....	709434	Sept. 16, 1902	Tubular dispatch apparatus.
Collis and Powell.....	714865	Dec. 2, 1902	Tubular dispatch system.
Powell.....	737271	Aug. 25, 1903	Receiving apparatus for tubular dispatch systems.

Under the above three entitled patents Powell gave a license to the New York Mail & Newspaper Transportation Co. and the Tubular Dispatch Co., their suc-

cessors and assigns, for pneumatic lines "now owned" (May 2, 1903) within the State of New York.

International Pneumatic Service Co. patents.

	No.	Date.		No.	Date.
Fordyce.....	624202	May 2, 1899	Fordyce.....	570163	Oct. 27, 1896
Bostedo.....	623509	Apr. 25, 1899	Do.....	575883	Jan. 26, 1897
Do.....	623510	do.....	Bostedo.....	583246	May 25, 1897
Do.....	597138	Jan. 11, 1898	Fordyce.....	599557	Feb. 22, 1898
Danley.....	623520	Apr. 25, 1899	Gillespie.....	617417	Jan. 10, 1899
Bostedo.....	563550	July 7, 1896	Fordyce.....	624201	May 2, 1899
Do.....	564965	Aug. 4, 1896	Bostedo.....	588948	Aug 31, 1897
Fordyce.....	570160	Oct. 27, 1896	Fordyce.....	627181	June 20, 1899
Do.....	570161	do.....	Do.....	635434	Oct. 24, 1899
Do.....	570162	do.....			

The American Pneumatic Service Co. owns the above company.

The Chicago Postal Pneumatic Tube Co. has a license from the International Pneumatic Service Co. under the above patents for the State of Illinois, excepting for use inside stores and buildings to carry cash, memoranda.

Lake Street Manufacturing Co. patents.

	No.	Date.
Forslund.....	682408	Sept. 10, 1901
Do.....	650107	May 22, 1900

The American Pneumatic Service Co. owns the above company.

The Chicago Postal Pneumatic Tube Co. has a license from the Lake Street Manufacturing Co. under the above patents for the State of Illinois, excepting for use inside of stores and buildings to carry cash, memoranda.

The following patents have issued to the American Pneumatic Service Co. since 1908:

	No.	Date.	Description.
Stoddard.....	914083	Mar. 2, 1909	Pneumatic dispatch tube system.
Do.....	914084	do.....	Dispatch tube apparatus.
Do.....	923308	June 1, 1909	Pneumatic dispatch tube system.
Do.....	923458	do.....	Pneumatic dispatch apparatus.
Do.....	923459	do.....	Pneumatic dispatch tube system.
Do.....	962796	June 28, 1910	Carrier for pneumatic tubes.
Do.....	962797	do.....	Pneumatic tube apparatus.
Do.....	975903	Nov. 15, 1910	Pneumatic dispatch tube apparatus.
Waterhouse.....	974617	Nov. 1, 1910	Receiving apparatus for pneumatic dispatch systems.
Do.....	974618	do.....	Sending mechanism for pneumatic dispatch apparatus
Jennings.....	984816	Feb. 21, 1911	Carriers for pneumatic dispatch systems.
Waterhouse.....	985957	Mar. 7, 1911	Receiving apparatus for pneumatic dispatch systems
Emerson.....	958240	May 17, 1910	Carriers for pneumatic dispatch tube apparatus.
Fordyce.....	1013148	Jan. 2, 1912	Pneumatic dispatch apparatus.
Do.....	1040302	Oct. 8, 1912	Pneumatic dispatch tube apparatus.
Do.....	1044876	Nov. 19, 1912	Do.
Do.....	1044877	do.....	Do.
Do.....	1044878	do.....	Do.
Stoddard.....	992822	May 23, 1911	Pncumatic dispatch apparatus.
Do.....	992823	do.....	Do.

The following patents were acquired by the American Pneumatic Service Co. by an assignment from the United Store Service & Tube Co., recorded June 3, 1910, liber V-84, page 123:

	No.	Date.		No.	Date.
Fordyce.....	873740	Dec. 17, 1907	Jennings.....	899599	Sept. 29, 1908
Waterhouse.....	881980	Mar. 17, 1908	Waterhouse.....	906342	Dec. 8, 1908

The following patents were acquired by the American Pneumatic Service Co. by an assignment from the Taisey Pneumatic Service Co., recorded February 6, 1911, liber L-86, page 85:

	No.	Date.		No.	Date.
Bemis & Collins.....	720804	Feb. 17, 1903	Taisey.....	705884	July 29, 1902
Taisey.....	653044	July 3, 1900	Do.....	711367	Oct. 14, 1902
Do.....	690675	Jan. 7, 1902	Do.....	729448	May 26, 1903
Do.....	701522	June 3, 1902	Bemis.....	975501	Nov. 15, 1910

The following under an assignment from the same company, recorded February 6, 1911, liber H-86, page 205:

	No.	Date.
Bemis.....	696305	Mar. 25, 1902

The following under an assignment from the same company, recorded April 19, 1911, liber P-86, page 270:

	No.	Date.
Bemis.....	712478	Nov. 4, 1902
Do.....	712479	Do.
Do.....	785468	Mar. 21, 1905

The following under an assignment from the same company, recorded September 25, 1911, liber R-87, page 420:

	No.	Date.
Collins.....	876859	Jan. 14, 1908

The following patents were acquired by the American Pneumatic Service Co. by an assignment from the Air Line Carrier Co., recorded July 24, 1911, liber L-87, page 383:

	No.	Date.		No.	Date.
Gipe.....	609275	Aug. 16, 1898	Gipe.....	660100	Oct. 23, 1900
Do.....	623899	Apr. 25, 1899	Do.....	723457	Mar. 24, 1903
Do.....	645505	Mar. 13, 1900	Thompson.....	800416	Sept. 26, 1905
Do.....	660099	Oct. 23, 1900			

The following patent was assigned from the same company, recorded September 25, 1911, liber J-88, page 23:

	No.	Date.
Thompson.....	958782	May 24, 1910

The following patents were acquired by the American Pneumatic Service Co. by an assignment from the National Pneumatic Service Co., recorded January 22, 1912, liber Q-88, page 480 :

	No.	Date.		No.	Date.
Forslund.....	652537	June 26, 1900	Churchill.....	713060	Nov. 11, 1902
Burton.....	653438	July 17, 1900	Ash & Woltman.....	720395	Feb. 10, 1903
Do.....	667185	Feb. 5, 1901	Churchill.....	723829	Mar. 31, 1903
Forslund.....	667209	Do.	Do.....	726815	Apr. 28, 1903
Bitner.....	677928	July 9, 1901	Do.....	726816	Do.
Woltman.....	682374	Sept. 10, 1901	Steinbock.....	730715	June 9, 1903
Do.....	682375	Sept. 17, 1901	Churchill.....	739049	Sept. 15, 1903
Churchill.....	713557	Nov. 11, 1902	Do.....	743060	Nov. 3, 1903
Do.....	713059	Do.			

The following patents were issued to the Bostedo Pneumatic Tube Co. (no record appears on the books we have of any assignment to the American Pneumatic Service Co.) :

	No.	Date.		No.	Date.
Bostedo.....	559095	Apr. 28, 1896	Foyer.....	750356	Jan. 26, 1903
Do.....	736680	Aug. 18, 1903	Fordyce.....	724688	Apr. 17, 1904

The following two patents issued to Foyer show no record of any assignment :

	No.	Date.		No.	Date.
Foyer.....	652960	July 3, 1900	Foyer.....	669491	Mar. 5, 1901

Batcheller Pneumatic Tube Co. patents.

[American Pneumatic Service Co., sole licensee, with exceptions as noted.]

	Num-ber.	Date.		Num-ber.	Date.
Batcheller.....	567067	Sept. 1, 1896	Batcheller.....	648375	May 1, 1900
Do.....	568291	Sept. 22, 1896	Do.....	657076	Sept. 4, 1900
Do.....	585647	July 6, 1897	Do.....	657077	Do.
Do.....	585498	June 29, 1897	Do.....	657078	Do.
Do.....	590181	Sept. 14, 1897	Do.....	657079	Do.
Do.....	595754	Dec. 21, 1897	Do.....	666175	Jan. 15, 1901
Do.....	595755	Do.	Do.....	700607	May 20, 1902
Do.....	595756	Do.	Do.....	706291	Aug. 5, 1902
Do.....	602422	Apr. 19, 1898	Do.....	707071	Aug. 19, 1902
Do.....	623968	May 2, 1899	Do.....	719421	Feb. 3, 1903
Do.....	623969	Do.	K. E. Stuart.....	721476	Feb. 24, 1903
Do.....	623970	Do.	Batcheller.....	722667	Mar. 17, 1903
Do.....	623971	Do.	Do.....	746266	Do.
Do.....	623972	Do.	Do.....	746267	Do.
Do.....	623973	Do.	Do.....	749152	Jan. 12, 1904
Do.....	632690	Sept. 12, 1899	Do.....	777328	Dec. 13, 1904

EXCEPTIONS TO LICENSE GIVEN BY BATCHELLER PNEUMATIC TUBE CO. TO AMERICAN PNEUMATIC SERVICE CO.

The rights of the American Co. do not cover the following districts :
State of Pennsylvania (except Pittsburgh district).
State of West Virginia.
"Camden district," New Jersey.
City of New York.

The New York Mail & Newspaper Transportation Co. and the New York Pneumatic Service Co. (assignee of Tubular Dispatch Co.) each has a license in the city of New York under the Batcheller Pneumatic Tube Co. patents.

The American Pneumatic Service Co. acquired a license under the following patents from Stuart. These patents were subsequently assigned to the Pearsall Pneumatic Tube & Power Co., under date of November 23, 1905; assignment recorded November 24, 1905, liber V-72, page 368; the license having been given by Stuart to the American Pneumatic Service Co., before title actually passed to the Pearsall Pneumatic Tube & Power Co., under date of November 1, 1905.

	No.	Date.		No.	Date.
Stuart.....	713924	Nov. 18, 1902	Stuart.....	744815	Nov. 24, 1903
Do.....	718740	Jan. 20, 1903	Do.....	789888	May 16, 1905
Do.....	744814	Nov. 24, 1903			

The American Pneumatic Service Co. acquired a license under the following patents from the Pearsall Pneumatic Tube & Power Co. under date of November 1, 1905; license recorded in liber J-64, page 13:

	No.	Date.		No.	Date.
Bavier & Hawkes.....	658102	Sept. 18, 1900	Pearsall.....	669485	Mar. 5, 1901
Pearsall.....	657886	Sept. 11, 1900	Do.....	673725	May 7, 1901
Bavier & Hawkes.....	658103	Sept. 18, 1900	Do.....	686680	Nov. 12, 1901

The American Pneumatic Service Co. acquired a license under the following patents from the Pearsall Pneumatic Tube & Power Co. under date of July 22, 1907; license recorded August 24, 1907, liber W-76, page 479:

	No.	Date.		No.	Date.
Pearsall.....	690894	Jan. 7, 1902	Pearsall.....	694324	Feb. 25, 1902

The American Pneumatic Service Co. acquired a license under the following patents from the Pearsall Pneumatic Tube & Power Co. under date of July 22, 1907; license recorded August 24, 1907, liber L-77, page 240:

	No.	Date.		No.	Date.
Batcheller.....	808623	Jan. 2, 1906	Batcheller.....	840465	Jan. 8, 1907
Do.....	840464	Jan. 8, 1907	.....do.....	840194	Jan. 1, 1907

The following two patents were licensed as applications under serial Nos., respectively, 251,208 and 251,209:

	No.	Date.		No.	Date.
Batcheller.....	862601	Aug. 6, 1907	Batcheller.....	862696	Aug. 6, 1907

The American Pneumatic Service Co. acquired a license under the following patents from Bemis, recorded April 19, 1911, liber P-86, page 270:

	No.	Date.		No.	Date.
Bemis.....	812162	Feb. 6, 1906	Bemis.....	803388	Oct. 31, 1905

WASHINGTON, D. C., *Tuesday, December 3, 1912.*

The commission met at 10 o'clock a. m.

Present: Senator Simon Guggenheim (chairman), Representative Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

The CHAIRMAN. I think Mr. Batcheller, who was before the commission yesterday afternoon, has something further to say. If so, we shall be glad to hear him now.

STATEMENT OF MR. B. C. BATCHELLER—Continued.

Mr. BATCHELLER. In my testimony yesterday I said something about the 8-inch tube as being the standard size tube, etc. I wish to make a further statement in regard to that this morning. The policy of the American Pneumatic Service Co. has been to build tubes of any size that the Government requires. It is not limited to any particular size, 8-inch tubes or any other size. The size of tubes that was adopted for mail transportation in the various cities was fixed by the Post Office Department, through their commission, which was appointed, if I remember correctly, in 1897, and that action was again confirmed by the commission of 1901. So that the size of tubes that has become the standard size for the transportation of letters was arrived at by the Post Office Department and not by the company.

There are certain advantages in the 8-inch tubes which I did not point out in my testimony yesterday and which I would like to refer to to-day. One particular point is the continuous manner in which the mail can be transported through an 8-inch tube. In other words, the unit of a packet of letters is small, and the mail is kept going almost continuously. On most of the lines in the New York system, which is the largest, from 5 o'clock in the morning until 11 o'clock at night there is scarcely a moment when there are no carriers in transit between any two stations. That means that the mail is not accumulating as it would be if it had to be transported in sacks. If it had to be transported in sacks the mail would have to accumulate in the stations until a sufficient quantity was collected for a sack, or until a certain period had elapsed. During the intervening period the tubes would not be in use. It is for that reason that you get so much higher efficiency with an 8-inch tube than you would, for example, with a 30-inch tube.

Mr. STEWART. A 30-inch tube, however, or a larger-sized tube than the 8 inch, would be very useful in the transmission of mail in bulk, Mr. Batcheller?

Mr. BATCHELLER. I recognize that there are certain places where there would be advantages in having a larger sized tube; for example, to a railway station where trains leave at fixed times. The mail for these trains must necessarily accumulate somewhere. It can not leave until the time for the departure of the train. Under those circumstances there would be certain advantages in having a larger sized tube, but to the postal stations I think there is an efficiency in the smaller size that could not be secured with the larger size.

Mr. STEWART. I suppose at some proper time you will be able to give us comparative figures on the cost of construction and operation

of the 8-inch-tube system and the system with reference to which you have an experimental plant in Boston?

Mr. BATCHELLER. I should be very glad to give you any figures that I can. One other word in regard to the 8-inch system. Of course there are times and places where congestion occurs in the 8-inch-tube lines. For example, where several lines converge upon a single line, and particularly during the rush hours at night, when the mail is very heavy. But the tubes, as a whole, are not used to anything like their full capacity. The tubes to the postal stations could carry a much larger quantity of mail than they are carrying at the present time. The carriers might in many instances contain many more letters and they could be sent more frequently. There are places, however, and hours when the lines become somewhat congested.

Mr. STEWART. There are times, of course, when the amount of mail to be dispatched is too great to be accommodated by the 8-inch tubes. Then, we could use a larger tube to greater advantage.

Mr. BATCHELLER. Yes, sir; particularly if you have a trunk line to take mail directly through to important points.

Mr. STEWART. We found, for instance, when we were negotiating for that tube to the Hudson Terminal that the 8-inch tube would not carry the mails that we had to transport there. We had to put on wagon service besides. So, between large centers, like the New York Central and the Pennsylvania Stations in New York, if we had a system of tubes by which we could transport mail in bulk there would be a large quantity of the mail that we could take off the wagon service and send it by that means.

Mr. BATCHELLER. The system north of Forty-second Street, New York, serves a number of postal stations, and I think there that the 8-inch tube has ample capacity to handle the mail at all hours of the day. South of Forty-second Street two 8-inch-tube lines, one extending down the West Side and the other down the East Side, I think would have ample capacity at all times to transport the mail of the stations along those lines, but they are used during certain hours of the day for sending mail from the general post office to the railway stations, and then it is impossible for the stations along the line to get off their mail promptly. Now, if there were one or two trunk lines—I think one would be sufficient—between the general post office and the new post office at the Pennsylvania station and the Grand Central Depot of a larger capacity than the 8-inch tube, then I think the present 8-inch tubes would handle all of the station mail, and the trunk lines would take care of the mail going to the railway stations.

I want to say a word or two about depreciation of the lines. Of course all machinery wears more or less. It has to be repaired, and if the cost of those repairs were not charged to expense it would properly be a subject of depreciation. Let me first speak of the tube itself. We find from experience that there is little or no wear on the interior of the tubes due to the carriers traveling through them. The carrier bearing rings are made of much softer material than the tubes, so that the wear comes almost entirely on the carrier. In fact, tubes that have been down for 10 or 12 years, when taken up show no appreciable wear. Some of the bends that were put in originally were brass. Those wore out quickly, but were replaced by cast-iron bends, which are more durable, and the cost of making

that change has been charged to expense. So the tube lines are to-day better than they were when they were built. Wherever the tubes have broken they have been replaced, and the expense of that replacing has been charged to expense. So far as the tube lines are concerned they have appreciated in value rather than depreciated. We sometimes have occasion to take up a tube. We examine it and clean it and probably put it back as a new tube in the line.

Mr. STEWART. Do you put the same tube back?

Mr. BATCHELLER. Yes, sir.

Mr. STEWART. And you find no appreciable depreciation of it?

Mr. BATCHELLER. We find no appreciable depreciation, except the brass bends that I spoke of, which have been replaced by cast-iron bends.

Mr. STEWART. Have those bends been entirely replaced by cast-iron ones?

Mr. BATCHELLER. I think there is only one, or possibly two, brass bends left in the four cities. They have practically all been replaced. The carriers are subjected to hard wear. They are replaced with new carriers about once a year, and the cost of replacing the carriers is charged to expense; so that there is no depreciation of carriers.

Now, in regard to terminal machinery. Of course, it occasionally gets broken, becomes worn, and has to be repaired. From time to time this machinery is replaced in part, or entire machines are put in, so that the system is maintained in a better condition than it was originally. The new machines that are put in are frequently of a later design and of an improved type. The same thing can be said with regard to the power machinery. The system, as a whole, is appreciating in value in the same manner in which a railroad appreciates because improved apparatus is used.

Mr. STEWART. Are you familiar with this statement that was submitted by Mr. Hayden yesterday?

Mr. BATCHELLER. No, sir; I am not familiar with it.

Mr. STEWART. Just note this item of depreciation in the table [handing Mr. Batcheller the statement referred to]. Do you know what they represent?

Mr. BATCHELLER. No; I do not. I have not examined it. Of course, the subject of depreciation is largely a question of bookkeeping. There is wear and tear, to be sure, but if that is charged to expense and the parts are replaced and new or improved machinery substituted, then the system is getting better rather than worse.

Mr. POWERS. I will say for your information, Mr. Stewart, that that depreciation charged there is depreciation on the Chicago plant by reason of limited franchise.

Mr. STEWART. That relates altogether to the Chicago plant and has reference to the limited franchise?

Mr. POWERS. Yes, sir.

The CHAIRMAN. Mr. Batcheller, how many miles of pneumatic tube are operated by your companies in each of the four cities—New York, Chicago, Boston, and St. Louis?

Mr. BATCHELLER. In New York and Brooklyn the actual mileage is 27.1290; the official 27.1189. There is a slight difference there because the contract limits the amount of mileage that can be paid for. In Chicago the mileage of double tubes is 9.6017; the actual

and the official are the same. In Boston the double mileage is 7.0117 actual; the official is 6.7740. In St. Louis the actual mileage is 1.9880, and the official mileage is 1.9465. The difference is due to a recent change made in the length of one of the lines which has not yet been officially recognized by the Post Office Department. The total actual double mileage is, therefore, 45.7304, and the official 45.4411.

The CHAIRMAN. Will you kindly explain the diameter of the tubes?

Mr. BATCHELLER. The diameter of the tube is $8\frac{1}{8}$ inches, actual, except for a small amount of tubing in Boston, which is 10 inches in diameter. At the bends it is made slightly larger.

The CHAIRMAN. Can you describe the construction of the tubes for the benefit of the commission?

Mr. BATCHELLER. The straight tubing is made of cast iron, like ordinary water pipe, with a bell cast upon one end and a bead upon the other. The joints are made by entering the bead end into the bell and caulking with yarn and lead. The interior of the tubes is bored smooth and accurate in diameter. The bends are made in short curve sections of cast iron flanged and bolted together. Their diameter is $8\frac{3}{8}$ inches inside. They are made smooth on the interior by a process of grinding. The stations are equipped with what we term terminal apparatus. It consists of two pieces of apparatus, a transmitter and a receiver. The former is a device whereby the carriers which contain the mail are passed into the tube without allowing the compressed air in the tube to escape. There are two gates. The carrier passes the first gate, which closes after it; then the second gate opens, and the carrier enters the tube. The receiver is a device that brings the carriers to rest when they arrive in a station and discharges them onto a table. This device contains a gate that closes the end of the tube, permitting the air to flow to one side through a by-pass.

The carriers are brought to rest by an air cushion that prevents shock. Then the gate opens and they are allowed to slide out on the table, where they can be taken up by the tube operator and emptied. The receivers are of two types. For a power station they have but one gate. At intermediate stations it is necessary to have two gates, in order that one may close behind the carrier before the second one opens and thus prevent the escape of compressed air. The power machinery consists of an air compressor which may be either a rotary or a reciprocating machine, driven usually by an electric motor. In some instances steam engines are used to drive the air compressors, but in most of the stations electric motors are used. The carriers consist of steel cylinders about 21 inches in length, 7 inches in diameter, inside measurement, closed tightly at the front end, provided with a hinged and locking lid at the rear end, where the mail is put in and taken out, and surrounded by two bearing rings on which the carrier travels as it goes through the tube. These are the essential features of the pneumatic-tube system as used to-day for the transportation of the United States mail.

The CHAIRMAN. How many stations have power plants?

Mr. BATCHELLER. In the four cities there are 18.

The CHAIRMAN. I presume some of the stations have no power plants at all?

Mr. BATCHELLER. No, sir; there are 46 stations altogether, of which 18 have power plants.

The CHAIRMAN. Where do these stations obtain their steam?

Mr. BATCHELLER. Steam is used only in the general post offices in New York, Brooklyn, Boston, Chicago, and St. Louis, and at Madison Square, in New York. In the general post offices steam is obtained from the boilers of the building. At Madison Square station, New York, steam is purchased from the Metropolitan Life Insurance Co., from their power plant in the building.

The CHAIRMAN. Do all the power stations use electric power?

Mr. BATCHELLER. Not all of them. The greater number of them use electric power.

The CHAIRMAN. Where does the electric power come from?

Mr. BATCHELLER. It is usually purchased from the public-service companies in the respective cities.

The CHAIRMAN. What are your rights in the streets?

Mr. BATCHELLER. In New York City we have a charter granted by the legislature of the State of New York, which gives the right to lay our tubes in any and all streets of that city, with the approval of the local authorities. In the other cities the franchises, I believe, have been granted by the local authorities.

The CHAIRMAN. Can those rights be transferred to the Government?

Mr. BATCHELLER. In the case of Government ownership I think that Mr. Stewart in the report of 1908 expresses the opinion that the Government has the right in the streets as post roads.

Mr. STEWART. That is correct, and the officers of the several cities practically admitted that in the correspondence which is set forth in this prior report.

Mr. Chairman, I think it might be well, in that connection, for the company to submit a specific statement in writing, describing the nature, character, and extent of their franchises in the several cities. I do not remember whether that was set forth particularly in the previous report or not.

Mr. POWERS. That, Mr. Chairman, we shall be glad to do and we will submit it with copies of the franchises and you will have them for your record. We have not that information with us at this time.

The CHAIRMAN. Suppose the Government should purchase the tubes, would a staff be required to maintain them, in your judgment?

Mr. BATCHELLER. I think they should have a staff; yes, sir.

The CHAIRMAN. What would the staff consist of?

Mr. BATCHELLER. I think there should be a superintendent of tubes in each city. He should have one or more inspectors to inspect the stations, machinery, tubes, etc.

The CHAIRMAN. Would that be a large expense?

Mr. BATCHELLER. No, sir; I do not think so.

The CHAIRMAN. Have you any idea about what it would be annually, say for each city; and can you give us just a rough estimate?

Mr. BATCHELLER. Mr. Emerson can probably answer that question better than I, and I would like to have him talk to you upon that subject.

Mr. EMERSON. At the present time, Mr. Chairman, we have, roughly speaking, 200 men operating these different systems. There

are four plants, at Boston, Chicago, New York, and St. Louis, and in each city we have a superintendent and under him usually two assistants. We operate in two shifts, 20 hours a day. These assistants we call inspectors. Then, of course, we have repair men. The remainder of our employees we call operators. They look after the receiving and the dispatching of the carriers which contain the mail. In round numbers, as already stated, we have 200 men employed in the operation of these plants.

The CHAIRMAN. Not exclusively for the Government?

Mr. EMERSON. Yes, sir; we do all the work of handling these carriers. The Government fills the carriers and all the work after that is done by our men. Are there some other questions in regard to the operation of these systems, Mr. Chairman, that you would like to ask me?

The CHAIRMAN. Yes. Mr. Stewart would like to know how many employees of the Government could take over part of the work if it became necessary.

Mr. EMERSON. I have made an estimate as to the cost of operating the tubes in case it were done by the Government. I think those figures have been already given to you. Of course if the Government were to operate these tubes, I assume that they would operate them on a basis of 8 hours' labor for each man, whereas we operate the tubes on a 20-hour-a-day schedule and our men are paid for 10 hours work. They are given a half hour for luncheon. They actually work $9\frac{1}{2}$ hours. In my estimate as to the cost of operating these tubes by the Government I estimated that, because of the 8-hour day, it would take approximately 25 per cent more men to operate the tubes than we have at the present time. Then, too, the Government would probably pay a higher rate of wage than we do. I estimated that the Government would probably pay for these operators at the rate of \$720 a year, which is an average rate for Government labor. We actually pay an average rate of wage of \$695 a year. These two items, of course, would increase the Government's cost of operation. On the other hand, in my estimate if you will look it over you will see that there is considerable decrease in total cost of operation by the Government from the fact that the Government would not have our large general expense item as we call it. My estimate shows, summing up all the figures, that it would actually be cheaper for the Government to operate the tubes on our existing conditions than it is for the company to operate them at the present time.

The CHAIRMAN. The Government would have the fixed expenses that you have?

Mr. EMERSON. This estimate which I am discussing covers all operating expenses. In other words, it would cost the Government practically the same to operate the tubes as it does our company for every item except labor and general expenses. It would cost more for labor, because of the eight-hour law and the slightly higher rate of wage paid. For the general expenses it would cost the Government considerably less.

The CHAIRMAN. How could the operation be best conducted by the Government? Would the Government require an engineer or a superintendent with technical knowledge, in your judgment, to operate the system?

Mr. EMERSON. My opinion is that, if the Government took over these tubes, they would require practically the same class of men—I might say, the same men—we have at the present time. If, for example, the operation of these tubes were put under a mechanical engineer of the Post Office Department or under the chief mechanical and electrical engineer of the Treasury Department, I see no reason why such supervising officials should not handle these plants in the same way as they handle any of their power plants. So far as the labor is concerned, they would have to take over the men that we have now or employ men of similar ability.

The CHAIRMAN. How about the extensions? Would it be better to have that done by contract or by the employees of the Government? I refer to the extensions for any new work.

Mr. EMERSON. I presume extensions would be let out by contract. So far as getting the labor to operate the tubes is concerned, we take what you might call very ordinary labor, not skilled labor at all, and we train such men in our work so that the better men, you might say, are skilled pneumatic-tube men, but still they are the most crude sort of labor. There is no difficulty in getting operating labor or men for supervising work.

The CHAIRMAN. I understand that the Government would not have very much difficulty in cases where it contracted for new work, but for the ordinary work that would be very difficult, at least at the commencement?

Mr. EMERSON. I do not think there would be any difficulty in the Government operating these tubes. I can not imagine any trouble.

Mr. POWERS. I would like to ask Mr. Emerson whether or not it is true that the Government is operating tubes at the present time?

Mr. EMERSON. Yes; that is true in the case of the 2-mile line between the appraiser's warehouse and the customhouse in New York City. That line is operated by the Government.

The CHAIRMAN. Well, that particular line is finished.

Mr. EMERSON. Nothing has been said so far during these hearings, I believe, in reference to the amount of mail we are carrying by pneumatic tube at the present time. Aside from the Philadelphia company, our four companies in New York, Chicago, St. Louis, and Boston are carrying at the present time, as near as we can estimate it at the present time, 18,000,000 letters a day.

Mr. MURDOCK. Along that line, Mr. Emerson, I would like to ask this question, in order to get the information on the record: I find in reading this report of the pneumatic-tube commission of 1908—and I read the report most carefully last night—this statement:

Under the total mileage covered in this report, 36 miles, over 10 per cent of the tube capacity is used daily on about 20 miles and less than 10 per cent on 16 miles.

Then, when I go into the data which is submitted with the report I find that a tube from Roxbury Station to Uphams Corners, in Boston, is used only to 2 per cent of its capacity. What about that, Mr. Emerson? Is that an economical service for the Government? Do you think that a tube that is used only to 2 per cent of its capacity is necessary?

Mr. EMERSON. Your statement, I think, shows the very large carrying capacity of an 8-inch diameter pneumatic tube. As a matter

of fact, an 8-inch diameter pneumatic tube will carry, in round numbers, 200,000 letters an hour in either direction.

Mr. MURDOCK. If you were a Government employee, would you recommend the construction of a tube from Roxbury Station to Uphams Corners?

Mr. EMERSON. That is a question which I can hardly answer. It is my understanding that no extensions of pneumatic-tube service are made except after a careful investigation and a recommendation by a commission of postal experts appointed by the Postmaster General.

Mr. MURDOCK. If you were a Government employee to-day in the Post Office Department would you recommend the construction of a tube reaching from Roxbury to Uphams Corners when it has been demonstrated that you can use only 2 per cent of its capacity for the transmission of the mail? You would not, if you were a Government employee, recommend the construction of such a tube. Would you recommend the Government to buy such a tube? You are acquainted with the tube; I am not. I simply take that information from this report and I should think that the construction of a tube to a station where only 2 per cent of its capacity could be used was rather indefensible.

There is another question I would like to ask for the purpose of getting it in the record. I find in the conclusions of the commission this statement:

Mechanically, the tube service appears to be still in an experimental condition, although considerable progress has been made toward the development of a fixed standard of machinery.

Now, Mr. Emerson, since this report was rendered in 1908, has there been anything mechanically added to the tube system which takes it out of the experimental condition?

Mr. EMERSON. Let me say this: That the statement in the 1908 report, in which it is set forth that the pneumatic tube is still in an experimental condition, is an absolute misstatement of fact. The tube in 1908 was not in an experimental condition. It had been perfected and had been in constant use and we had been getting the highest efficiency of service from it for at least 10 years.

Mr. MURDOCK. Then you disagree with that conclusion?

Mr. EMERSON. I disagree with that statement.

Mr. MURDOCK. To go back again to this proposition of the per cent of tube capacity utilized. I ask you the following question for the purpose of arriving at some idea of what they mean by the capacity of a tube. I find that in the city of Boston, from the South Station to Essex Station, but 6 per cent of the capacity of the tube is utilized; from Essex Station to Back Bay Station, but 5 per cent; from Essex Station to Station A, 6 per cent; from Station A to Roxbury Station, 4 per cent; and from Roxbury to Uphams Corners, 2 per cent. I find that in Philadelphia, from the general post office to Station S but 5 per cent is utilized; from Station S to Station O, 3 per cent. Now, what do they mean by capacity of the tubes?

Mr. EMERSON. I think I can explain that in this way: The tubes operate for 20 hours a day. Now, the tubes have a certain capacity per hour. They can carry so much per hour and the investigating committee have multiplied 20 hours per day by the actual volume which the tubes can carry in an hour and called that the 100 per

cent capacity of the tubes. Now, each one of these tubes during certain hours of the day, when the mail is heavy and is being used to a greater extent, in some instances to 100 per cent of its capacity, but when you take it on a period of 20 hours a day there are certain times when the tube is not being used at all. On that basis it does not show that the tube is being used to its capacity at any one time. I hardly think that is the proper way to judge the tube.

Mr. MURDOCK. The highest efficiency of a tube would be its constant use for the expedition of the mail?

Mr. EMERSON. Surely.

Mr. MURDOCK. And I understand that in New York City you do reach 66 per cent of capacity?

Mr. EMERSON. Yes, sir.

Mr. MURDOCK. Do you not think that when you get down to 2 per cent, 4 per cent, and 5 per cent of the capacity, and when you have that little mail that can be expedited in the course of 20 hours' service, that you really have no use for the tube in that situation?

Mr. EMERSON. No; I do not think so. It is a question, of course, as to how much mail is benefited. The pneumatic tube is essentially a service to the mail. It is not a cheap piece of transportation. First-class mail is paying at the present time approximately \$1 a pound to be transported from its origin to its destination. The question is, in my opinion, not one of transportation, not one of carrying the mail as a matter of bulk, because, of course, it would be far cheaper to carry the mail by a slower means, but, in my opinion, it is the question of the service which is given the mail. The 1908 report goes into this matter very fully and it shows—I have forgotten the exact figures—that so many million letters are carried a day and that only a certain per cent of that amount is actually benefited by pneumatic-tube service; that is, that the remainder of the mail could have been carried by some other way just as well. But the actual cost for carrying a letter which was benefited by pneumatic tube was only some one-hundredths of a mill.

Mr. MURDOCK. I assume that you have recently read that report?

Mr. EMERSON. I am very familiar with it.

Mr. MURDOCK. Do you remember that in that report the statement is made, among other conclusions, that some of the tubes reaching from stations to post offices are inadequate—that is, that they do not carry the mails? Now, there is a case where a tube for 20 hours will not work up to 1 per cent of its capacity.

Mr. EMERSON. That is not so.

Mr. MURDOCK. I would like to be enlightened on that point.

Mr. EMERSON. Perhaps for one hour it is working to more than a hundred per cent of its capacity, but taken over the 20-hour period you will see that there are certain hours when it is not working anywhere near its hundred per cent capacity. Take the busiest tube we have; the 1908 commission estimate it as working 66 per cent of its capacity. During certain hours of the day that tube can not carry all of the mail; during other hours it is carrying very little of the mail.

Mr. MURDOCK. So there is no tube in the service, to your knowledge, that works 20 hours a day continuously?

Mr. EMERSON. They all work 20 hours a day.

Mr. MURDOCK. But not to capacity?

Mr. EMERSON. They are not loaded up every hour during the 20 hours.

Mr. MURDOCK. Not even between post offices and railway mail stations?

Mr. EMERSON. No, sir.

The CHAIRMAN. Whose fault is it that the system is not working continuously and what is the reason for it?

Mr. EMERSON. The simple reason, sir, is that the mails congest at a certain time in the day. The business men all mail their letters in the afternoon. In the morning there is incoming mail, but there are certain hours in the day when the mail is very light. In other words, there is a peak load in the same way that an electric light plant has a peak load.

Mr. POWERS. And is it not true that there is no public utility that is working to its full capacity? The Pennsylvania Railroad, between Washington and New York, I suppose, is not worked to over 25 per cent of its capacity. The cables between this country and Europe were worked to only 15 per cent of their capacity. The trolley roads running up Pennsylvania Avenue are not worked to 5 per cent of their capacity. A full capacity on a railroad would mean one train right after another. Full capacity on these tubes means one of those carriers right after another during the 20 hours. That, of course, we do not do.

Mr. STEWART. There is another view of the subject that is set forth in these statistics in regard to Roxbury Station, to which reference has been made. It is shown that first-class mail dispatched daily by tubes numbered in pieces 46,250, while by other means it was only 1,730. The number of pieces of first-class mail received daily by the tubes was 59,500, while the number of pieces received by other means was only 1,800. So that you can see that the tube performs a very important function in dispatching and receiving mail.

Mr. MURDOCK. Mr. Stewart, I call your attention to the fact that Roxbury Station has annual postage receipts of \$93,000, and Uphams Corners of \$37,000. They must be rather small stations. It just struck me as I read this report that if I had had charge of the Government's business I do not believe I would have constructed a tube to those stations.

In connection with your statement, Mr. Powers, about the capacity, I was led to inquire about the capacity of these tubes from the fact that somewhere in this prior report I found this statement:

The closest interval between two carriers, originally expected to be 6 seconds, is now 13 to 15 seconds, so that the total number of letters dispatched one way per hour is rated at 108,000 instead of as in the early days 360,000.

Reading that statement my mind naturally arrived at the conclusion that a tube was used all the time, and I am rather surprised to find that it is not. An expensive service—\$17,000 a mile per annum—it would seem to me would have to be used all the time?

Mr. POWERS. It is like travel over the railways—at certain periods of the day the cars are crowded and at other periods they are not.

Mr. EMERSON. Let me say in that regard that the tube is being used all the time. The only question is that it is being used more at sometimes than at others. We may be sending only one carrier a

minute in the morning, but at other times we are sending six or seven carriers.

Mr. MURDOCK. How did it happen that the original estimate was so far afield with regard to the figures submitted?

Mr. EMERSON. I can not say as to the original estimate. As a matter of fact, we are sending between six, seven, or eight carriers a minute at the present time, whereas this report says we are sending only four. In certain places we are sending between seven and eight.

Mr. STEWART. I think that before we leave this question of Roxbury and Uphams Corners stations, Mr. Murdock, it ought to be said for the record that service was authorized to those stations in Boston upon the recommendation and report of a pneumatic tube commission.

Mr. MURDOCK. Have you any instances in mind where any mail has been diverted from wagon service or street car service or any other service in the postal system and put into the tubes for the purpose of getting the tube business and keeping them busy.

Mr. EMERSON. No; I have not.

Mr. MURDOCK. Nothing of that kind has ever come to your observation?

Mr. EMERSON. I would not know it if it were the case. We simply take the mail that is given us and transport it. We have no knowledge of what the mail is in any way.

Mr. MURDOCK. I confess that I am somewhat confused as to this matter of utilizing the capacity of a tube. It seems to me that where we have an expensive tube and it does expedite the mail—if it does—that we ought to use that tube nearly all the time during the 20 hours of a postal day's business between two stations.

Mr. STEWART. You will do it if you have the business. It has to be adapted to the business of the office, and if at the proper time we visit some of these cities that point will be entirely cleared up when you see how the tube service must be adapted to the accumulation and dispatch of the mails. For instance, in St. Louis a tube is used to a very low per cent of its total efficiency, but it is entirely on account of the peculiarities of the situation in St. Louis; that is, the manner in which the mails are handled.

Mr. MURDOCK. I have in mind this: If we have a ton of mail at the post office in Washington and we want to dispatch that ton of first-class mail on a train bound for New York out of the Union Station in Washington and we have the two places connected with the tubes, if there is an expedition of the mail from the Washington station and thence to New York through a tube it looks to me like that tube would be utilized to its capacity; but, as a matter of fact, I believe there is no expedition of the mail through that to the station. I believe that you can take a ton of mail and put it in a screen wagon and get it to this station before you can get it through one of the tubes. So I think my question with regard to the capacity is a very vital point concerning the whole matter. In other words, the tube does not expedite the mail in all instances, and in a great many instances it does not expedite the mail at all. Whenever the bulk becomes more than an 8-inch tube can carry then expedition fails.

Mr. STEWART. That is true; and I do not think there is anybody that claims that for the tube service now. It is supplemented everywhere by the wagon service. Where you have a large bulk of mail

to be transported at once you have to carry it by other means than by the tubes. After those dispatches are begun, then the tubes come in.

Mr. EMERSON. There is a certain page, Mr. Murdock, in this prior report that I think should be put into the record. Perhaps it will help explain your question. On page 28 of the 1908 report the following statement is made:

FIRST-CLASS MAIL ACTUALLY ADVANCED BY TUBE.

Out of a total of 15,899,047 pieces dispatched daily at the tube offices, 1,835,338 pieces, or 11.4 per cent, are reported to have been actually advanced in dispatch. Out of a total of 14,167,002 received daily, 787,533, or 10.6 per cent, are reported to have been actually advanced in delivery. The total number of pieces actually advanced daily by tube was therefore 2,622,871. The total annual pay for tube service early in October, when these statistics were taken, was \$615,400, or, say, \$1,686 per day.

That is, it charges the entire cost of pneumatic-tube service in this paragraph against the mail which was actually benefited—some 2,000,000 pieces—and it carries the balance of the mail, some 12,000,000, free.

Mr. MURDOCK. I want to call your attention to the summary made on page 31 of the same report, which read as follows:

	Miles.
Mileage on which over 50 per cent of capacity is used-----	5,760
Mileage on which over 25 per cent but less than 50 per cent of capacity is used-----	9.995
Mileage on which over 10 per cent but less than 25 per cent of capacity is used-----	3.795
Mileage on which under 10 per cent of capacity is used-----	16.770
Total-----	36.320

Mr. EMERSON. Of course, sir, this refers to 1908, and since that time more mail is being carried.

Mr. MURDOCK. That is a very interesting statement. Is there an increase in the utilization of the capacity of these tubes since that report was made?

Mr. EMERSON. There is no question about that.

Mr. MURDOCK. How does that come about?

Mr. EMERSON. Perhaps principally by the annual growth in the postal business, and, secondly, in the fact that the post office is finding more ways or means for utilizing the pneumatic-tube service. Then, too, I think the public, particularly in New York City, is sending more special-delivery letters because of the pneumatic-tube service. These facts, however, are something that can be obtained from the Post Office Department.

Mr. MURDOCK. But it is your belief that there is an increase in the capacity of these tubes?

Mr. EMERSON. I know that, because at the present time we are carrying 18,000,000 a day, whereas in 1908 all the systems—that is, including the Philadelphia system, which I do not now include in my figures—were carrying but 14,000,000 a day. So that shows that there is an increase.

Mr. MURDOCK. And in the course of time you think that there will be diminution in this immense amount of what I would call waste capacity? You think as time goes on they will use the tubes more and more?

Mr. EMERSON. Undoubtedly, sir. Still, I doubt if it ever goes over 66 per cent by this means of figuring.

Mr. MURDOCK. It has reached that in New York in one instance now.

Mr. EMERSON. Surely; and in that instance, during perhaps seven hours of the day—that is, when the mail is being most handled—the tubes are being used to 100 per cent of the capacity; but there are hours when they are being used to only 20 per cent of their capacity, and for that reason, stating the capacity on a basis of 20 hours a day service, brings the total capacity utilized for the day considerably less than 100 per cent. I think, sir, in other words, that this is a misleading way of putting the utilization of the tube service. I think it should be put in some other way in which it would appear clearer.

The CHAIRMAN. Does your company enjoy certain patents?

Mr. EMERSON. Our apparatus is patented.

The CHAIRMAN. Does that give you a monopoly in the way of those patents?

Mr. EMERSON. We claim it does.

The CHAIRMAN. In what respect can the Government operate the tubes more economically than the companies are now operating, according to your judgment?

Mr. EMERSON. We have already submitted certain figures on this subject, but, to put it briefly, in my estimate I find that it would cost the Government practically the same to operate the pneumatic tubes as it costs this company for every item except labor, and labor would cost more because of the eight-hour day and because of a higher rate of wage. On the other hand, the Government would not have the very large general expense which we have, the greater part of which is for legal services, salaries, etc. The Government would not have these expenses which the company has, and these offset the increase in labor cost, so that by my estimate the Government, on our present basis, could operate the tubes on an eight-hour day for slightly less than it costs the company to operate the same tubes.

The CHAIRMAN. If the Government were to charge up all the items that they should, I do not see how the expenses would be reduced any.

Mr. EMERSON. I am referring simply to operating expenses. I include all the items of operating expense.

The CHAIRMAN. Are there any advantages that would accrue to the Government by the ownership, in your judgment?

Mr. EMERSON. Under Government ownership of the tubes, of course, the Government would have the absolute control of the tube service. At the present time the operation of the tube is limited to 20 hours a day. The Government in some instances might wish to operate them 24 hours a day, and in some instances, perhaps, they would wish to operate them less. The Government's control of its own utilities, it seems to me, is advisable. This tube is used exclusively for the post office. It connects different post offices. It is really an extension of the post office. It carries United States mail alone. The employees of the company, while paid by the company, are Government employees. I can not see any disadvantage to Government operation. Perhaps I can answer the question best in that way.

The CHAIRMAN. That is what we are trying to find out.

Mr. STEWART. Can you see any difficulty in the Government operation? You are a superintendent of some of the systems and should be able to speak with regard to the operating viewpoint.

Mr. EMERSON. I have charge of our four system; yes, sir. I can not see any difficulty. The Government, for example, operates its power plants. Our tubes are really machinery, and if the Government can operate its power plants, which are much more intricate than pneumatic-tube machinery, I do not see any reason why they can not operate the pneumatic tubes.

Mr. STEWART. We would have to have some men with technical learning or experience?

Mr. EMERSON. Yes. I understand that all of the Government's power plants come under the chief mechanical and electrical engineer of the Treasury Department. His department certainly has engineers who are fully qualified to operate the pneumatic-tube service.

The CHAIRMAN. Was this system of tubes used first in our country, or was it first adopted abroad?

Mr. EMERSON. It was first used in this country; that is, the large tubes. There are small tubes abroad, but the large tubes are only used in this country.

The CHAIRMAN. Do you know whether the Governments abroad have gone into the question thoroughly as to the use of the tubes?

Mr. EMERSON. I do not know about that, sir. Mr. Batcheller, I think, can give you additional information with regard to the foreign plants, if you wish that. I know that two or three years ago some one went into the question of using what might be called a small automatic railway system, such as we have at Cambridge. I do not think one was ever built. I remember reading about it in some consular report.

Mr. BACHELLER. I will repeat what I said yesterday: In European cities they have never used pneumatic tubes to transport the regular mails. They have only used them for special letters and telegrams. For the special letters and telegrams they have gone into the subject quite extensively. They have used the system for 40 years, more or less, and have gradually extended it.

Mr. EMERSON. The figures which you have show in detail the estimate, as I prepared it, stating the cost of Government operation.

Mr. STEWART. Can you submit the cost of construction for the several systems in the several cities?

Mr. EMERSON. Is not that item already given, Mr. Stewart?

Mr. STEWART. I think this information we have relates altogether to the cost of operation. What I had in mind was some sort of a statement with reference to the cost of construction, especially the original cost.

Mr. EMERSON. If it is not in the statement submitted, we can give you that information.

Mr. STEWART. Can you also furnish, approximately, the cost of reproduction? I think you gave our former commission those figures.

Mr. EMERSON. Mr. Batcheller did, I believe.

Mr. POWERS. We would be glad to give you that information, Mr. Stewart.

Mr. STEWART. Then I think it might be well to submit a schedule of your patents which you hold or control.

Mr. EMERSON. That was also given the former commission, was it not?

Mr. STEWART. Yes; but it was not published, and those files are in the department somewhere, and I think it would be well to have them before this commission.

Mr. POWERS. Some time before the commission adjourns I desire to make a brief statement regarding the question of price. That inquiry was made yesterday of Mr. Hayden as to what he would sell the plant to the Government for, give good title and free from all encumbrances. He answered it by saying that the company would be willing to sell for a price which would represent the capitalization of the savings at 6 per cent. Now, the capitalization of the savings, as we look at it, would amount to something like \$6,500,000, at 6 per cent; that is, assuming that the savings are in the vicinity of \$400,000. Last year—that is, the fiscal year which ended in March—the Government paid us in round numbers \$759,000. That was the contract price. We saved out of that as net earnings \$340,000. In other words, you may say the plant, as a going concern, earns 6 per cent upon about \$6,000,000. Yesterday Mr. Murdock suggested the plan, which I understood, although I am not familiar with it, had been adopted by the Interstate Commerce Commission, of determining the value of the plant which is made up of three elements—one being the cost of the plant, the other being its value as a growing concern, and the other the cost of reproduction. If you take those three items, what we bid for those plants, the value of the plant as a growing concern on a basis of 6 per cent of \$6,000,000, and the cost of reproduction, I think you will reach, in substance, the same figures again, of \$6,000,000. Now, we believe that along with this plan, if you reach the conclusion that it is feasible and desirable for the Government to own those plants we can reach an estimation which is absolutely fair to the Government.

I want to say just one word with reference to the cost of reproduction. I do not imagine that this commission, made up as it is of men of large experience, is in any way misled by that question of reproduction. It is not a question of what it costs us to build the plants; it is a question of what men to-day with capital, having our experience, having the benefit of our experimentation, and having considered the matter carefully, could build those plants for. It may have cost us \$10,000,000 to build those plants, and perhaps you can build them to-day for \$4,000,000. That is not the question. I am interested in the building of a gun and have been for 10 years. It has cost us over \$200,000 to produce that gun, and yet that gun can be reproduced to-day for \$30. Now, it would hardly be fair to say that we should turn over our patents to the Government and sell that gun to the Government for \$30. That is exactly what it means with reference to these plants. The men who went into the building of those tube lines years ago expected to make money. They were willing to put in their capital; they had not the slightest idea what it would cost. No doubt the Post Office Department looked upon it as a new method by which it might render the greatest service in the transmission of mail, and they said, "You go ahead," and they cooperated with them. We have gone ahead, and I think Mr. Stewart will say that the men who have developed this pneumatic-

service system have acted with the highest degree of patriotism from the very first. We have to-day a system which is of the greatest service to the country. It is true that it is not being operated to its full capacity, but it will be operated more and more every year to its full capacity. I believe you will reach the conclusion that you are just entering upon this development of pneumatic tubes. With your parcel post coming on you will find it will be more and more needed by the postal department as the years go by.

Now, I wish to say just one more word, and that is this: If you will give to the company which we gentlemen represent a contract for 50 years for the same price that you are paying us to-day, with an agreement that so long as we perform our part of that contract that the contract shall stand, then we will go ahead and we will raise the money and we will finance these extensions to the fullest extent that the Government desires; but to-day we have a contract which expires a little over three years hence. It is for a period of 10 years; and if I am correctly informed, the position taken by the Postmaster General has been that it can continue only at the pleasure of the Postmaster General. In other words, that even during these 10 years the Postmaster General may at his pleasure discontinue that contract. I want to ask you gentlemen if you would feel like putting your own money into a contract which was terminable at the pleasure of the Postmaster General. The Postmaster General does not continue for all time in that office; he changes; in one administration he is one man, and in another administration he is another man. That is the kind of contract we have. Give us the kind of a contract which business men make with each other—a contract for a sufficient length of time and a contract that will stand so long as the contracting party performs the terms of that contract—and we can raise the capital; the public will contribute to it then. We are here to-day simply because we can not raise the capital to give to the United States Government that kind of equipment and extension of equipment which you demand.

We have not a thing to keep back from this commission. All information which you have called for and which you may call for will be submitted to you for your inspection, and we believe that you will reach the conclusion in the end that the Government by ownership of this system can save money. I believe you will reach the conclusion that you can save, over what you are paying us to-day, at least \$400,000 a year. Four hundred thousand dollars a year in the next three and a half years means \$1,400,000. In other words, \$1,400,000 toward the purchase price, if it be \$6,000,000, is substantially one-fourth of the entire sum which the Government can save in the next four years. Then, put us in a position with a contract by which we can raise the capital, and we will go ahead and perform this service in a manner such as the Government demands.

I have nothing further to say, Mr. Chairman, except to put that in that way; and I think you can understand perfectly that that means an offer to sell at a price to be arrived at in one of those two or three different ways, which is substantially \$6,000,000.

The CHAIRMAN. Are there any other of you gentlemen who wish to be heard?

Mr. POWERS. I should say, of course, that we are here to-day as directors or officers of the company. Any proposition which we

make to you, if acceptable, would have first to be submitted to our stockholders. My belief is, however, that our stockholders have sufficient confidence in the officers to adopt our recommendation.

**STATEMENT OF MR. W. P. J. MURRAY, TREASURER OF THE
INTERNATIONAL PNEUMATIC TUBE CO.**

Mr. MURRAY. Four years ago, at the time the commission then went into the question of the purchase or advisability of the purchase of pneumatic tubes, the method then was of sending forward a long list of questions, which the companies went into with their counsel and answered to the best of their ability. With regard to this commission we were under the impression that that procedure would likely be followed; in fact, so much so that yesterday—although we had heard indirectly that there would be a meeting of the commission—we had no idea that they would enter into the matter as they have apparently done. What we crave is a fortnight's time to get our data in shape and especially to get our chief engineer here.

The CHAIRMAN. We expect to give you all the time you ask for within reason.

Mr. MURRAY. In a fortnight's time we would be pleased to have two or three hours' time at the utmost.

The CHAIRMAN. If you are not ready at this time, if you will write a letter to the commission we shall be glad to give you an opportunity at some future day to be heard.

Mr. MURRAY. I shall be glad to do that.

The CHAIRMAN. If there is nothing else, the commission will now go into executive session.

Mr. POWERS. I do not think we have anything further to offer at this time. We wish to cooperate with you and assist you to get a full knowledge of the entire situation.

I would like to have a memorandum, if Mr. Stewart will furnish it to us, as to just what he has asked us to furnish the commission. We shall be glad to furnish everything that has been asked for.

Mr. WILLIAM H. AMES. I would like to extend an invitation to the commission to visit the New York system. I think you would be highly interested in seeing it in operation. I think Mr. Murdock will understand then why they are not operating to their full capacity.

Mr. MURDOCK. I am very desirous of seeing the tubes in operation.

The CHAIRMAN. The commission will probably visit New York for that purpose.

Thereupon, at 11.30 o'clock a. m., the commission adjourned to meet again at 10.30 o'clock a. m., December 9, 1912.

WASHINGTON, D. C., *Monday, December 9, 1912.*

The commission met at 10.30 o'clock a. m. pursuant to adjournment.

Present: Senators Simon Guggenheim (chairman), and Hoke Smith, Representatives Fred L. Blackmon and Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

Mr. STEWART. Mr. Chairman, before beginning with the witnesses I desire to present to the commission some documents which have

been submitted to me as Second Assistant Postmaster General by the American Pneumatic Service Co. in response to questions which I asked. I submit them with my own letter of transmittal.

The CHAIRMAN. We will now hear from Mr. Masten.

Will you please give us such information and throw such light on the situation as you can, Mr. Masten? With the exception of Mr. Stewart, this question is a new one to the members of the commission.

Mr. MURDOCK. I suggest, Mr. Masten, that you start in the regular way and state what your official position is and what your connection with the pneumatic-tube service has been.

STATEMENT OF MR. JOHN M. MASTEN.

Mr. MASTEN. My name is John M. Masten. I am now Superintendent of the Railway Mail Service at Pittsburgh, Pa., and, previous to December 1, 1911, I was attached to the Second Assistant Postmaster General's office as an Assistant Superintendent of the Railway Mail Service, detailed in connection with an investigation of contract mail service; since June 1, 1902, and also between December 18, 1890, and about September 1, 1898, in the same capacity. In that assignment I had many investigations to make in connection with other departmental officials and by direction of the Second Assistant Postmaster General of proposed and contemplated pneumatic-tube service in different cities of this country.

Mr. MURDOCK. You were appointed, were you not, on a commission in 1907 to investigate the practicability of the purchase of this system by the Government?

Mr. MASTEN. I was appointed on such a commission; yes, sir.

Mr. MURDOCK. And you signed the unanimous report against the purchase of the system at that time?

Mr. MASTEN. I did.

Mr. MURDOCK. Now, have you had any experience subsequent to the filing of that report which would give you a slant toward the purchase at the present time of that system?

Mr. MASTEN. I have retained my active connection with the investigations and inspection of the pneumatic-tube service since 1908, and up to the present time, except that within the past year, my other duties at Omaha, Nebr., and Pittsburgh, Pa., have not been such that I could give specific time to the pneumatic-tube service.

Mr. MURDOCK. Let me refresh your memory on this very vital part of your former report. There are some nine conclusions enumerated by the Pneumatic Tube Commission of 1908, and No. 5 is as follows:

Mechanically the tube service appears to be still in an experimental condition, although considerable progress has been made toward the development of a fixed standard of machinery.

Do you know of anything which would persuade you to change in any way that finding? Has there been any subsequent development of the tube service itself or any invention or any increase in the size of the tubes which would lead you to come to a different conclusion than you did in 1908?

Mr. MASTEN. There has been a constant progress toward the standardization of all machinery used in the pneumatic-tube service; in the propelling machinery—that is, the air compressors and blowers

in the forms of pneumatic-tube receivers and transmitters and in regard to the size of the tubes as well. Recent investigations have been made of a 30-inch and a 36-inch pneumatic tube for the transmission of all classes of mail, instead of the smaller standard 8-inch size, which is largely used for the transmission of first-class mail, registered mail, and the smaller articles of the fourth class.

Mr. MURDOCK. In that connection, have you had any personal contact and experience with the larger tubes; as for instance the tube which is now operated between the House of Representatives and the House Office Building, a tube whose mechanical process is one of creating a vacuum in front of the tube? Do you know about that tube?

Mr. MASTEN. I have inspected that tube informally and I know something of the character of the machinery they use, that system having been operated in the form of a 10-inch tube used in the mail service of the city of Boston for a period of time. Here in the large tube between the Capitol and the House Office Building they have enlarged the size of the tube and the extent of the machinery, but it is practically the same system that was used in Boston.

Mr. MURDOCK. If we can demonstrate that a larger tube is practicable, a tube which will carry a unit of mail transmission—which is the pouch or sack—as a postal official, would you recommend the purchase of a smaller tube, which is available only for the transmission of first-class mail?

Mr. MASTEN. On the contrary, I think there is a place for the large tube—the 30-inch tube.

Mr. MURDOCK. Will you explain in detail why we should have three different sizes of tubes?

Mr. MASTEN. Because of the inequality of the mail. The 30-inch tube is enormously expensive to construct on account of the space it will take in the streets and the space required in its operation at the terminals and in the general post offices and at railroad stations. It would almost entirely supercede other forms of transportation, the screen wagons, the automobiles, or whatever might be at present used. The small tube, the 8-inch tube, is designed and used almost entirely for the transportation of first-class mail at present, because of the possibility of constructing it at a much less expense than the larger tubes, which would carry all classes of mail, and because it furnishes a more frequent service. The 8-inch tube has a carrier, which will weigh in the neighborhood of 15 to 25 pounds when loaded with mail.

The operator at the tube terminal can pick up those carriers and set them down, lock and unlock them, open and dump them—that is, empty them of mail, all they wish to without the providing of a mechanical system for handling the carriers at the terminals. It is very much like a man laying bricks. He can pick up bricks and put them in place all day. It is within the physical capacity of the man. In the case of the 30-inch tube, I should say that the development of it would be by means of tracks in iron tubes or in conduits built of brick or concrete, with rails or some fixed means for the carriers to run on; and at the terminals and in the post offices and the railway stations it would be necessary to have a miniature railroad yard for the switching of those large carriers. Such a system was investigated at Cincinnati in 1910 and we found that those con-

ditions were practically imperative in order to handle the pouches and sacks. The frequency of dispatch as compared with the 8-inch tubes would be very much less, one a minute as against four or five a minute in the case of the 8-inch tube.

Mr. MURDOCK. As a matter of fact, the original estimate on the efficiency of the 8-inch tube has never been lived up to as regards frequency of dispatch as shown by your report. Is not that true?

Mr. MASTEN. I think that is true in a general way; at least it is true with qualifications.

Mr. MURDOCK. Not to break the line of your narrative, why do you supplement the provisions of a 30-inch and an 8-inch tube with the suggestion of also a 6-inch tube? What would you use your 6-inch tube for where an 8-inch tube would not apply?

Mr. MASTEN. I would use it in the less important parts of the city where the 8-inch capacity would not be required for the handling of the first-class mails and for mail of that character, registered mail, and second, third, and fourth class mail. That 6-inch tube is in operation now. The first pneumatic tube constructed in the United States was a 6-inch line in 1893, and it is still in operation carrying the mail in Philadelphia between the general post office and the Bourse station at Fourth and Chestnut Streets. It furnishes quite a large capacity for the first-class mail and the section of the city in Philadelphia supplied from the Bourse station, or tributary to the Bourse station is the financial district. The mail originating there is very important. We found that the 6-inch tube would carry that mail successfully. In the earlier stages of the investigation consideration was given to the adoption of a supplemental service in connection with the larger 8-inch tube reaching the outlying stations in order to provide a thorough and a complete pneumatic tube service in the cities under examination.

Mr. STEWART. I think the point that is in the mind of Mr. Murdock and I know will be in the minds of other members of the commission in regard to the use of the larger tube and the smaller tube in the same system is this, Mr. Masten: What conditions are there in the postal service in the large cities in reference to the accumulation and dispatches of mail which would make it advantageous to use tubes of those sizes? Take, for instance, the city of New York, which would give an illustration of that. How could the large tube be used there to advantage in dispatching mails in bulk and at the same time how could an 8-inch tube be also used to advantage?

Mr. MASTEN. The large tube could be used, taking the city of New York as an example, in the very congested parts of the city, as between the general post office on Park Row and the new post office at the Pennsylvania Station, Eighth Avenue and Thirty-second Street, and to the Grand Central Depot and the post-office station located adjacent thereto, Forty-fifth and Lexington Avenue. That is the trunk line as comparing it to a tree. That is the trunk of the tree and the 8-inch line would be the branches or the limbs of the tree which would reach the other more distant postal stations where the same quantity of mail would not be transported and where the frequency was not so desirable and necessary. The frequency from the downtown financial part of New York City and the uptown railroad stations is now required at every 10 or 15 minutes for a wagon load of mail going to the Pennsylvania Railroad into the Grand Central

Railroad, each one. From the Grand Central postal station, north of the east side of the city, a much less frequent service is required. There is a less quantity of mail to be carried and a less number of possible connections to be made. The same is true of the west side from the Pennsylvania Railroad and post office.

Mr. MURDOCK. Do I understand you to say that at some of these stations in New York more mail is offered in postal administration for transportation through tubes than the tubes can handle?

Mr. MASTEN. That is true, Mr. Murdock.

Mr. MURDOCK. Then, how do you explain that in view of the fact that the very highest efficiency shown in New York is over 66 per cent of the capacity of a tube?

Mr. MASTEN. It is explained by the fact that the mail does not originate evenly throughout the entire 24 hours. The great bulk of the incoming mail is handled in the morning from 5 o'clock until half past 9. The great bulk, or 75 per cent of the outgoing mail of the entire 24 hours is handled in the evening between 4 and 9 o'clock p. m., so that 75 per cent of the mail must be given transportation in a matter of 5 hours and only 25 per cent be handled in the remaining 19 hours.

Mr. MURDOCK. Between the two rush periods, Mr. Masten, there comes the period then in which the tube can not be utilized to its full extent in the expedition of the mail?

Mr. MASTEN. It can not, because the mail does not originate in those hours.

The CHAIRMAN. Is that entirely a physical question?

Mr. MASTEN. The capacity of the tube is fixed. It can operate at one hour just as efficiently as any other hour.

Mr. MURDOCK. In the late evening hours there is more mail offered than the tube can handle?

Mr. MASTEN. Undoubtedly, in New York City.

Mr. MURDOCK. Then its capacity must be at that time 100 per cent, but in the interim between these two rush periods enough mail is not offered to be expedited continually through that tube.

Mr. MASTEN. Enough mail is not received, is not turned over to the post office to completely utilize the full capacity of the tube. We found that that was true in Boston between 6 and 6.30 p. m., and between 9.30 and 10 o'clock at night. We found it true in Chicago between 6 and 8 in the evening between the post office and the Union Depot more mail was offered, more mail to be transported, letter mail, than the pneumatic tube, fixed to capacity, could handle.

Mr. STEWART. By "fixed to capacity" you mean 20 hours a day continuous service?

Mr. MASTEN. Yes; based upon 20 hours of operation at the fixed rate aggregating 9,600 possible dispatches for the 20 hours' time.

The CHAIRMAN. In plain English, the mail is not available?

Mr. MASTEN. The mail is not there. If we have the larger mail, the tube would be used to the larger capacity, because it would be used up to the full extent during the 24 hours and thereby the total use of efficiency would be increased. The average there is misleading as it is in many other cases. The average does not include the maximum and it includes the minimum.

Mr. MURDOCK. Let me get your idea. If this Government had at the present time a pneumatic-tube system there would be an entire

use for at least two size tubes, one a large tube and the other a small tube, the small tube to be used as a branch to the trunk, the larger tube, in your opinion, would carry the unit of mail to be transported—the sack or pouch of mail—and the smaller tube would carry a carton for first-class mail. Now, does that state precisely your position?

Mr. MASTEN. That is clear in representing my belief in regard to the use of the pneumatic-tube service.

Mr. MURDOCK. That idea of yours does not extend to the point that you would have parallel lines and large tubes running between the same stations.

Mr. MASTEN. Yes; because the large tube in New York between the post office and the Pennsylvania Railroad would be the trunk line and the express line, only carrying the mail between those two terminals, while the 8-inch tube would run between the same points, stopping as it does now at the branch post office at Canal Street, at Prince Street, at Eighteenth Street, and at Thirty-first Street; that is, Stations V, A, O, and E. Those are all big post-office stations, Station O having a revenue and a quantity of mail equal to the city of Buffalo; Station A being also a very large station and its business amounting to as much as a city of 300,000 people. It is in the wholesale millinery and fancy-goods district. Station V is down in the wool, boot, and shoe district, and has a large mail. The 8-inch tube now is used to its capacity between the post office and Station E, going by way of Stations A and O. While there is need for the 24-inch tube as a trunk line between the post office and the Pennsylvania Railroad and thence to the Grand Central Depot——

Mr. STEWART. And also the Hudson Terminal.

Mr. MASTEN. I hardly think so. The Hudson Terminal is a letter station—that is, used for letter mail only—and the 8-inch tube furnishes approximately the capacity that is needed from the Hudson Terminal to the post office and the other East and West Side lines. There is a period in the evening in which it will not carry the total mail, but it furnishes approximately the capacity needed. The Hudson Terminal is the mailing division of the New York post office. It is only four minutes away from the post office and was provided by the department simply because the post office on Park Row did not have enough space to do the necessary work. It is an adjunct to the general post office. It is a mailing division for the handling of letter mail.

Mr. BLACKMON. Mr. Masten, did I understand you to say a moment ago that the adoption of the 30-inch tube would do away with the screen wagon and the automobile service?

Mr. MASTEN. Almost entirely do away with it. I believe it will do away with it between the points that are connected.

Mr. BLACKMON. What is the objection, or is there any objection, to doing away with that service if the 30-inch tube would answer the same purpose?

Mr. MASTEN. I know of no objection to doing away with the screen wagon or automobile service, and in certain places I can see a use for the 30-inch tube, because the service on the surface of the streets is not efficient; too much time is consumed. The wagons from the general post office in New York to the Pennsylvania Railroad are given 34 minutes' running time from one point to the other. From the post office to the Grand Central they are given 40 minutes. The

30-inch tube operating at 30 miles an hour, or approximately that, would cover that 3 miles in a matter of 6, 7, or, say, 10 minutes at the utmost.

Mr. BLACKMON. Do you know what the comparative expense is in reference to the wagon or automobile service and the pneumatic-tube service? I am asking now for information. I have not seen anything on that point.

The CHAIRMAN. Was that covered in your former report, Mr. Masten? If it was, we can easily get the information from the report.

Mr. MASTEN. It was not in the former report—that is, as applied to New York. I think New York would necessitate the maximum of cost for the construction of a large tube on account of the great use of the streets for other underground structures, the water, the gas, the telephone conduits, and the telegraph, and underground street railroads; their systems are all operated by the underground conduit system, and it was found quite difficult to get a space for the 8-inch tube in the down-town part of the city.

Mr. STEWART. They might be elevated, Mr. Masten.

Mr. MASTEN. They would have to be carried on other streets than those used for the 8-inch tube, and at a considerable depth. Crossing Broadway coming from the east side to the west side with the 8-inch tube was found to be almost impossible.—The tube line as constructed in New York across town had to be changed, and from its former location extending from the Grand Central postal station to Station G was the first proposed cross-town connection. At Broadway, in the neighborhood from Forty-second Street to Forty-sixth Street, the street was occupied by the Interborough Transit and Telephone, and the wire conduit which completely blocked any possible crossing of that, and connection was finally established between the Grand Central postal station and the Times Square postal station through Thirty-ninth Street, really getting away from the subway which runs through Forty-second and Broadway.

Mr. MURDOCK. Mr. Blackmon, I wish you would press your inquiry as to the relative cost of screen-wagon service, as compared to the pneumatic-tube service for the transmission of mail in bulk.

Mr. BLACKMON. I was going to ask Mr. Masten if any estimate had been made on that, and, if so, if we can get it.

Mr. STEWART. I think an estimate was made in Cincinnati on eighty one-hundredths of a mile between the post office and the Union Station. Then, the department now has a pneumatic-tube commission—that is, a departmental commission—considering the question of a large tube between the Pennsylvania Railroad station and the Grand Central station in New York. In that connection, the companies who are proposing to submit bids, if we advertise, will soon submit, if they have not already done so, to this committee the probable cost. We could compare that with the cost of maintaining the wagon service between those points.

The CHAIRMAN. I think the greatest factor would be not so much the screen wagon as the motor power. Is there anything available in that line?

Mr. STEWART. Yes; we are making use at New York of that now.

Mr. MURDOCK. Will those figures be available for the use of this commission?

MR. STEWART. Oh, yes; they will be available.

MR. MURDOCK. Both the motor car and the screen wagon?

MR. STEWART. Yes.

THE CHAIRMAN. The motor car might be a factor, particularly if we can not get a franchise for the tube system.

MR. BLACKMON. I would really like to have an estimate made as to the relative cost and the time. I can understand where the service might be more rapid through the tube, but the cost might not warrant that slight saving in time.

MR. STEWART. Of course, you must take into consideration the fact that when you are underground you get rid of the congested street, which is a very material point in most of the big cities, and is growing more so every day.

MR. MASTEN. The committee in Cincinnati that investigated the large tube referred to the condition there as favoring the construction of a 36-inch tube as against almost any other size.

THE CHAIRMAN. Will you see, Mr. Stewart, that the information asked for is furnished to this commission—that is, as to the cost of the motor cars as well as the other cost?

MR. STEWART. That is, compared with a tube of, say, 30 inches in diameter between the two points for bulk mail. In other words, a tube which would practically supersede the other service?

THE CHAIRMAN. Yes; or vice versa.

MR. STEWART. Yes; I will have such information prepared, and I think these data which will be submitted to the commission which is now sitting will give us the basis for it.

THE CHAIRMAN. Are there any other appliances that are being experimented with that might be advantageous, so far as you know, Mr. Masten?

MR. MASTEN. There have been a great many devices offered to the department for investigation, but upon investigation many of them have not been found adapted to the purpose. The 36-inch tube in Cincinnati was recommended, as the cost was not excessive for its construction, and its use offered an opportunity for a very interesting experience, to determine what quantity of mail it would carry, how frequently the carrier could be operated, and what amount of space would be used at the terminals for the proper handling of the mail, the shifting of the cars, and the loading and unloading of them. Quite an amount of space is given up to that in New York; that is, in the handling of the mails in and out of wagon. Practically a private street has been constructed in the rear of the post office which is devoted to the mail wagons alone. Any conveyance that would limit the amount of space occupied in the streets of Chicago, New York, Philadelphia, and Boston would be a very desirable thing, and would, to some extent, justify the increased cost for the carrying of the mails. In times of storm, sleet, and snow, it is very hard on the horses, and it is almost a complete blockade for automobiles with slippery rubber tires. At such times the people are mailing just as many letters and just as many newspapers and just as much advertising matter, and the problem of handling mails in time of storm is always a severe test for the Post Office Department.

MR. MURDOCK. It seems that the Boston Pneumatic Service Co., which operates both interior and exterior service tubes, is capitalized for about \$13,000,000, and Mr. Hayden, who appeared for the com-

pany here as its banker, said that of those outstanding securities \$7,000,000, in round numbers, represented that part of the company which operated the exterior tubes, namely, those tubes which are used by the Government. Have you any recollection as to whether or not those figures are about as you found them in 1908, or has that passed away from your memory?

Mr. MASTEN. I think the commission, in 1909, found that the approximate cost, as near as it could be verified, amounted to something like five and one-half million dollars, but that since 1909 there has been some additional construction in New York, as, for instance, between the Grand Central postal station at Forty-sixth Street and One hundred and twenty-fifth Street, connecting up Stations Y, K, U, and L; an additional line between Stations O and C; the connection of a new postal station at One hundred and sixteenth Street, Station I, and the removal of Station J from One hundred and twenty-fourth Street and Eighth Avenue to One hundred and twenty-fifth Street, near Eighth Avenue; also some additional construction in Chicago between the old postal station at the Union Depot and the Canal Station at the Chicago & North Western depot, and the restoration of the tube connection between the post office and Kinzie Station, including the building of a private tunnel under the Chicago River.

Mr. MURDOCK. You think, then, that all this new construction is the reason for the difference between the valuation in 1908 or 1909 of five and a half million dollars and the present valuation of seven million dollars?

Mr. MASTEN. I do not think I would be competent to answer that question without an opportunity to get better information.

Mr. MURDOCK. Our present annual rental for these tubes is \$17,000 a mile. Mr. Masten, in your opinion is that enough?

Mr. MASTEN. As an average in the cities which are now connected by pneumatic tubes, I should say that it was fair. As applied to individual systems as in New York, it hardly seem adequate. The committee of 1909 found a material difference in the cost of construction and operation in New York as compared with Boston, Chicago, and Philadelphia, representing a difference of approximately 25 per cent, as I now recall it.

Mr. MURDOCK. So that you think in some instances the pay is adequate and in others it is not?

Mr. MASTEN. Yes.

Mr. MURDOCK. In your belief is it in any instances excessive?

Mr. MASTEN. I am not prepared to answer that specifically. While I realize that there is some difference in the cost of construction in the different cities, there are also other conditions which tend to approach the average or approach the present allowance of \$17,000 a mile. For instance, in St. Louis the terminals have been changed from the old branch post office at the Union Depot to the new post office. That change was made without the allowance of but a very, very small addition to the annual rental, yet it represented a considerable cost, as under the contract the pneumatic tube companies are required to remove their apparatus from one post-office location to another whenever the post office moves. In Philadelphia, as another illustration, the pneumatic-tube terminals at the Broad Street Station have been moved twice from their original location,

each time without the allowance of any or but a very small additional rental. In New York City those changes in location have been quite frequent. They embrace Stations A, O, J, the Grand Central postal station, Station D, Station F, the Wall Street station, and Station P at the customhouse. Those changes have been made in every instance without the allowance of any rental or, if any, but very small, in addition to their annual rental.

Mr. MURDOCK. It is very interesting to know whether in the case of an abandoned line any use whatever can be made of it after it has been abandoned by the Government by reason of a change in location of a station. For instance, when Station J in New York City was changed by the Government, could the company put the tube to any use?

Mr. MASTEN. The change is made usually without interrupting any portion of the line except the branch connection that leads from the street into the post office, and opening the tube at another point, providing a side connection into the new location.

Mr. MURDOCK. I am speaking particularly of where a lateral has been abandoned for some length. There are instances of that kind, are there not?

Mr. STEWART. Take Station F in New York, for instance; are you familiar with the facts connected with that station, Mr. Masten?

Mr. MASTEN. Station F was formerly located on Third Avenue, near Twenty-eighth Street. The branch connection from the main line on Fourth Avenue was carried through Twenty-eighth Street into Third Avenue and into Station F. Upon its relocation on Thirty-fourth Street, between Lexington Avenue and Third Avenue, the old line from Fourth Avenue through Twenty-eighth Street was entirely abandoned and was lost.

Mr. MURDOCK. What was the length of that?

The CHAIRMAN. It would be six blocks one way, would it not?

Mr. MASTEN. No; from the point of connection on Fourth Avenue and Twenty-eighth Street the line abandoned was for the one block between Fourth and Third Avenues and about a hundred feet in Third Avenue. The two lines at Twenty-eighth Street, where the bends were taken out and straight connections inserted in their places, form a through line, and the break was made at Twenty-third Street, and a new line constructed over to Station F; relatively, I should say, an abandonment of 700 feet of old, unused line and the building of a thousand feet of new line.

The CHAIRMAN. It is really, then, making a new junction?

Mr. MASTEN. Yes; making a new junction and building a new track.

Mr. MURDOCK. Was any portion of the 700 abandoned feet afterwards utilized by the Government?

Mr. MASTEN. Not at all; it remains in the ground unused.

Mr. BLACKMON. Mr. Masten, could an occasion arise where they could use that for commercial purposes? Could it be connected up and used for other purposes than transmitting the United States mails?

Mr. MASTEN. I hardly think so, because unused iron pipe in the ground rusts and deteriorates very rapidly. Its use in the pneumatic-tube service would result in its constant lubrication and con-

stant repair. When that constant repair ceases the deterioration is very rapid, and I should say that after a short period it would be unfit for any other use.

Mr. MURDOCK. It is true, Mr. Masten, that it worked a hardship on the companies when this line was abandoned?

Mr. MASTEN. I say that those are the things that tend to form the impression in my mind that the \$17,000 a mile is not an exorbitant rental, and, in fact, tends to make up a reasonable rental under the conditions in which the contracts are entered into.

Mr. MURDOCK. And these changes which work a hardship upon the companies would work a hardship upon the Government in case the Government owned the tubes, would they not?

Mr. MASTEN. Probably; yes.

Mr. MURDOCK. Why not absolutely?

Mr. MASTEN. It is hard to express that in language, but it seems to me that if the Government owned the tubes and were operating them, they would not make these changes. Their location would be more fixed and stable.

The CHAIRMAN. That is, before deciding upon removal they would take into consideration the question of cost?

Mr. MASTEN. Absolutely.

Mr. STEWART. It would tend also to establish permanently the location of postal stations, and when we once got the tubes in the ground to those stations they would be very slow to make changes. I would like to say for the benefit of the commission and so that it will appear in the record that these changes that were made and that have been described here are made, of course, to meet postal emergencies that arise, and the company is required to make them under what the department believes to be the terms of the contract and the obligations of the company under those terms.

The CHAIRMAN. The company, in other words, knows in advance that they might be called upon to make such changes?

Mr. STEWART. The present management of the company did not enter into these contracts. They were entered into by a previous management of the company, and the company as it is now constituted—at least, the executive officers—take issue with the department upon our construction of that part of the contract; but, nevertheless, the department has maintained that attitude—that it has a right under the contract to require these changes without any remuneration for abandoned tubes.

Mr. MURDOCK. Mr. Masten, are there any branches of this pneumatic-tube service of which you have knowledge which you would abandon, if you were an executive officer, by reason of small use?

Mr. MASTEN. There are several instances of comparatively small percentage of use of the efficiency furnished by the tubes, but none which I would abandon. The percentage of efficiency furnished by the tubes throughout the 24 hours leads to some queer results, and it does not indicate the relative use during the busy hours, and the form of construction has an effect upon that. In New York there are a great number of stations strung upon one line, there being eight in the East Side and nine in the West Side lines from the general post office to One hundred and twenty-fifth Street, which results in a comparative high utilization of the total capacity of the tubes. A construction, however, upon the radial system, as from a hub in

the form of spokes leading out, will result in the same quantity of mail being carried and the percentage of use of the capacity very much smaller for the same mileage for the same number of stations connected and for the same amount of mail carried. The radial form of construction offers the larger capacity. The elongated line furnishes a percentage of use as compared to the total capacity which is detrimental to the radial form of construction. In Philadelphia and Boston and Chicago the lines are constructed practically under the radial form, leading in several different directions to the central or general post-office station. In New York the post office is in the extreme southern part of the city and the lines must reach nine or ten miles in one direction, touching eight or nine post offices, and the percentage of use shows there the highest for relatively the same amount of mail and the same number of post offices connected. The expense of construction is no greater, because a certain length of pipe will connect two stations, but in use the elongated line shows a higher percentage of use.

Mr. MURDOCK. And that is material in the case of New York?

Mr. MASTEN. That is very material. If it were possible to construct the lines upon the radial system in New York, the capacity would be increased.

Mr. MURDOCK. I would like you to explain that, because it is rather contradictory to what you have just said.

Mr. MASTEN. The capacity would be increased and the percentage of use would be lowered.

Mr. MURDOCK. That is right.

Mr. MASTEN. I will endeavor to explain that. Here are nine post offices upon one line reaching from the post office to One hundred and twenty-fifth Street in New York connected up in one elongated row or line. The mail for the section between I and J is carried on directly between the post office and Station A, between the post office and O, etc., so that the maximum number of carriers containing mail for each one of these intermediate stations travels over the first section, the third section, the fourth section, and so on, and the use of a number of carriers decreases by the number containing mail to be delivered at the first station, further reduced by the mail to be delivered at the second station, and further reduced by the number to be delivered at the third station, etc., until, on the last section, the use is confined to the number of carriers that contain the mail for the last station. On the radial lines——

Mr. MURDOCK. Just a moment right there. On your first section, out of the general post office, you might have an efficiency of 60 per cent, and on the last section out of your post office on the same line you might have an efficiency of 4 per cent. Is that true?

Mr. MASTEN. That is true. Upon the first section you might have a hundred and upon your last section only four, and your average would be the difference of your four and the one hundred divided by the number of stations, bringing the total efficiency down to sixty.

Mr. MURDOCK. Then it is absolutely mathematically correct to say that the longer your tube the less your efficiency will be at the outer end of the tube?

Mr. MASTEN. The greater will be the use in your first section and the lighter the use in the extreme sections.

Mr. MURDOCK. What I had in mind was the case of the Uphams Corners out of Boston. I do not understand why there should be only 2 per cent of efficiency on a tube such as that. Is it because it is an outlying station?

Mr. MASTEN. It is an outlying station. It is the end of a line leading from the post office through the South postal station, the Essex Street station, the south end station, Station A, and the Roxbury station, so that the percentage of use of the Uphams Corners station is the lightest, and between the post office and the South postal station is the heaviest.

Mr. MURDOCK. Well, then, what was the radial proposition which you were describing when I interrupted you? You gave an example of the elongated system as applied to New York. You were endeavoring to show how you could increase the capacity of the tubes by radial system.

Mr. MASTEN. By having nine independent spokes in the wheel instead of one elongated line containing the nine sections. The percentage of use on each one of the nine lines leading from the hub would be the amount of mail carried on each one of these separate lines, and none of them would include the number of carriers or the amount of mail transported over any other one.

The CHAIRMAN. You can not do that in New York on account of the city being on an island.

Mr. MASTEN. You can not do it because the location of the post office is against the utilization of the radial system to the same extent that it is used in Boston.

The CHAIRMAN. You might adopt it in Boston, but not in New York.

Mr. STEWART. In other words, the system must be built to comply with the physical conditions of the city and the service.

The CHAIRMAN. But the population runs from north to south in New York City. That is the greatest drawback.

Mr. MURDOCK. I want to ask you this question, Mr. Masten: Under the terms of the franchise which the Pneumatic Tube Co. now has with the city of Chicago the tubes themselves go to the city in 1923. In your opinion, what would be the rights of Chicago in a matter of that kind if the Government should now acquire the tubes?

Mr. MASTEN. The rights of the city of Chicago, in that contingency, would be the same if the Government owned the tubes as though a private corporation owned them, but the opportunity to have that franchise changed and the Government secure the ownership would be comparatively easy. In other words, the city of Chicago will unquestionably deal with the Government more liberally than it would deal with a private corporation. To illustrate a little further, the ownership of the city of Chicago in 1923 will consist of the tubes laid in the public streets and not to any of the terminals located on the private property leased by the Government or owned by the Government, so that the city of Chicago will have a lot of pipes in the streets underground which have no terminals or connections and no feasible way to use them, while the terminals all being located on Government property or on property leased to the Government will still be within its control.

The CHAIRMAN. Is it not more than that? The Federal Government could possibly say to the authorities of Chicago, "Unless you

give us the free use of tubes there will be no use for the tubes hereafter."

Senator SMITH. The least Chicago could do would be to say, "You can have them."

Mr. MASTEN. If the city can make any use of these detached lines of iron tubes laid underground, without terminals, they might exact a price for them, but if they can not utilize them, it would be like the white elephant, they would be glad to give them away.

Mr. MURDOCK. The city of Chicago gave a franchise that they considered very valuable, and the men to whom they gave it consider it valuable, so valuable that they contract to turn these tubes over to the city of Chicago in 1923, and it seems to me material that if the Government is going to purchase those tubes we know, as a commission, precisely where the rights of Chicago are in that connection. I think, Mr. Masten, that the tubes would be more valuable to the city of Chicago than you instance.

There is another question I wanted to ask you. Mr. Hayden, in his testimony before this commission, suggested that inasmuch as the annual rental was \$760,000, paid by the Government to the company, and that the cost of operation was \$380,000, that if the Government took the tubes over we would pay the difference between \$760,000 and \$380,000, which would be \$380,000. That is mathematically correct, is it not?

Mr. MASTEN. I catch the figures, and our commission in 1909 made a calculation of the ratio of operating expenses to the maximum pay of \$17,000 a mile and found, for instance, in Boston, the operator's cost to be relatively 14.92 per cent of the cost of operation; the carriers' repairs and renewal, 11.29 per cent; and the repairs to the tube and machinery, 9.73 per cent, a total of 35.94; that the power cost 22.76 and that the general expenses were 5.32, making a total cost of operation per mile of 64.02 per cent of the \$17,000 a mile, leaving a balance of 36 per cent to go into other expenses and profits, as, for instance, practice, dividends, cost of raising the capital, and their own general company expenses.

In New York we found those figures to represent a total of 91.82 per cent, leaving only a little over 8 per cent to go into the profit, interests, general company expenses, and the cost of raising capital.

In Chicago we found the figures to be 63.79, in St. Louis 68.67, and in Philadelphia 57.72. Relatively it might be claimed that the cost of operation—that is, the cost of labor and power—would be approximately 50 per cent, but I think our figures show that it is about two-thirds.

Mr. MURDOCK. You found approximately what Mr. Hayden testified to. Mr. Hayden says that the earnings of the company being approximately \$400,000 a year, and that amount being 6 per cent on \$6,600,000 a year, that therefore \$6,600,000 is a fair purchase price for this property. Do you think that is a fair method of estimating the value of this property to the Government?

Mr. MASTEN. That is going into deep water for me, because I do not know whether an opinion that I would hold would be competent for your guidance or instruction. It probably would not be fair to estimate that the cost of these tubes to the Government should be the cost of replacing them, because there has been a period of experimentation, a period of exploitation and promotion through it all.

Forms of machinery have been revised and discarded for better. The cost of construction in various ways has been changed. Old brass bends that were formerly a necessity have been discarded and iron bends substituted at a very large reduction in cost. The cost of any one single item in pneumatic tube operation—that is, of the carriers to contain the mail—has been very much reduced.

Mr. MURDOCK. By the way, one of these carriers, I understand, costs about \$20 originally, and its annual repair is something close to that. Is that true?

Mr. MASTEN. We found the cost, I remember, within a 12-months time was almost the original cost.

Senator SMITH. Do I understand that the net profit is \$400,000 a year?

Mr. MURDOCK. Approximately that; \$380,000.

The CHAIRMAN. That is for all the companies except the Philadelphia company.

Senator SMITH. Their franchises run for about 10 years longer?

Mr. STEWART. The franchise, as I understand it, is perpetual in all cities except Chicago, and that ends in 1923.

Senator SMITH. Of course, in Chicago, with their franchise ending in 1923, it would be entirely unfair to capitalize their annual net profit as though it were permanent net profit. The only way would be to estimate it on a 10 per cent basis, and that is the present value of that annual profit for 10 years; that would fix the present value of the property. Say, put it on a 4 or 5 per cent basis and then calculate the present value for 10 years for the sum which covered their profit. That would fix the value of their Chicago plant.

Mr. MASTEN. I do not think their whole plant in Chicago expires in 1923. They will still own the terminals.

Senator SMITH. Anything they have that is a franchise with a deed of expiration could not be treated as a permanent investment, but should be treated as an annuity for a limited number of years in determining its value.

Mr. BLACKMON. The terminals would not be of value without the use of the tubes.

Senator SMITH. The terminals are real estate, are they not?

Mr. MASTEN. They are in the nature of improvements to real estate; upon leased ground to the Government, not to the Pneumatic Tube Co.

Senator SMITH. They put the improvements on?

Mr. MASTEN. Yes; they put the improvements on.

Senator SMITH. But they probably have not the right to limit the improvement, and it belongs to the Government at the end of its contract.

Mr. MASTEN. They can remove them at the expiration of their contract, and, in fact, they are required to remove them. In order to maintain an efficient service it is necessary for the tube companies to keep their terminals, their line, and all machinery in perfect repair, constantly as new machinery. They can not be operated unless the machinery is in first-class condition and practically as good as new.

Senator SMITH. That is a condition that does not need explanation to anyone, I should think.

Mr. MASTEN. No, sir; the air compressors, the electric motors, the blowers, and all those things have some value.

Senator SMITH. It would be very easy to estimate the value of them. The point I was making was that when they had a limited franchise it would not do to undertake to capitalize on the basis of an income from a limited franchise. It would have to be reduced to its present value.

The CHAIRMAN. Unless they were using the service for something else. Mr. Masten, do they use it for anything else except the transportation of the mails?

Mr. MASTEN. This particular size of tube is not used anywhere except for mail service.

The CHAIRMAN. Do you find that there has been much improvement in the service since the report of 1908 was made?

Mr. MASTEN. I find that some improvements in machinery have been made. At the time this report was made the company was really experimenting with rotary blowers which cost much less than air compressors and are more economical to operate. The experiments for more than two years with those blowers have fixed them as standard for succeeding installation. That reduces the cost of primary installation of pneumatic tube service. It inures to the benefit of the company by reducing the cost for power.

Mr. STEWART. How about the dispatching and receiving apparatus?

Mr. MASTEN. That has not undergone very many changes since the date of the commission's report referred to; but the continued use since that time has demonstrated the present form of terminal machinery to be the best, and has fixed that machinery as standard.

The CHAIRMAN. There is one thing I should like the commission to ascertain, and that is information with regard to what is being done in Europe; whether the companies abroad have made any improvements, and if they have put the service in effect. How can we arrange for securing the information?

Mr. STEWART. I can get that information through our department.

The CHAIRMAN. That ought really to be brought up to date, then, Mr. Stewart.

Mr. STEWART. I will see that that is done.

Mr. BLACKMON. Mr. Chairman, I believe the House meets at 12 o'clock. How long does the commission wish to remain in session this morning?

The CHAIRMAN. We can adjourn and meet at a later hour to-day. As it is now 12 o'clock, we will take a recess until 2 o'clock, if that is agreeable to other members of the commission.

Thereupon the commission, at 12 o'clock noon, took a recess until 2 o'clock p. m.

AFTER RECESS.

Pursuant to the morning adjournment, the commission met at 2 o'clock p. m.

Present: Senators Guggenheim (chairman) and Smith, Representatives Blackmon and Murdock, and Second Assistant Postmaster General Stewart.

STATEMENT OF MR. JOHN M. MASTEN—Continued.

The CHAIRMAN. Now, Mr. Masten, you might go ahead and give us the benefit of such information as you have on the subject.

Mr. MASTEN. Mr. Chairman, I appeared before the committee largely to answer any questions that might be asked me concerning the pneumatic-tube mail service that had been installed in any of the five cities in which it is in operation. I have no general statement to make in regard to the service, but shall be pleased to answer any questions. I might say, however, that the question of the large tube has been given a great deal of consideration in the department back as far as 1896 when I was a member of the committee to make an examination for such a proposed service in Philadelphia. From that time on I have familiarized myself more or less with all of the big tube projects that have been offered to the department. It can certainly be accepted as a fact that the 24-inch tube can be installed indiscriminately wherever tube service may be needed, but only where the demand is for something which the 8-inch tube will not supply. The great profit in the postal service is in the first-class mail, and it is that which is given preference in all of the operations of the post office. The second, third, and fourth class matter, with the possible exception of the daily newspapers, is relegated to the rear; that is, to the time when the first-class mail having been taken care of, the clerical force can be put to work on the other classes of mail. The great profit from first-class mail has induced the consideration to be given to the workable size of a tube that will carry the first-class mail, depending upon a slower and cheaper means of transportation for the other classes, but the slower and cheaper forms of transportation do not apply when a very congested city is under consideration, and where the quantity of mail to be handled is very large, and where the frequency of surface transportation is great. New York City I specified a while ago as an example where the large tube would be economical and profitable to the Government if it could be installed at all, for the very reason that there is great congestion in the streets and an exceptionally large quantity of mail to be handled, aggregating some 377 tons a day when we made our examination in 1908, and because of this bulk a very frequent service. 10 or 15 minutes by wagon.

Mr. MURDOCK. Mr. Masten, there seems to be somewhere in the postal business lap service so far as wagon and pneumatic-tube transportation is concerned. Do you know of any such instance where between two points mail is carried in wagons and in tubes?

Mr. STEWART. Where they supplement each other. Is that what you mean, Mr. Murdock?

Mr. MURDOCK. Yes; or where they might duplicate each other.

Mr. MASTEN. There is no example in our service where the pneumatic-tube service is involved where there is not some wagon or electric-car service alongside of it. For instance, the pneumatic-tube service is only contracted to be operated 20 hours a day, and for four hours other means of transportation is used—wagons, automobiles, or electric street cars. That comes from the fact that the special provision must be made for the letter mail and the pneumatic tube having been provided largely for that service, and other cheaper

and slower means for transportation in the other classes of the mail which do not require so much expedition.

Mr. MURDOCK. You just mentioned a service which has not been brought out at all in the hearings, and that is the electric-car service, which is a very expeditious service, as a matter of fact. Is it not possible to use the electric-car service in all these large cities, say New York, as against the pneumatic-tube service without serious expedition loss?

Mr. MASTEN. It is, as a matter of fact, used in all of the principal cities between the main offices and the branch offices and the suburban points in the vicinity of these large cities, but except in a few cases it is not used for the carrying of all of the mail; for instance, in Omaha, Nebr., where I have recently been located, they absolutely discontinued all of the wagon service and substituted the electric-car service for it from the main office to the big railway depots and to all of the post-office stations and to South Omaha, the big packing district. In Chicago there is no screen-wagon service employed in the city except between the main office and the depots. All other service to the branch office, to the stations throughout the city, is performed by the electric mail cars, except to nine of the branches which have in addition the pneumatic mail service.

The CHAIRMAN. Would not motor cars make better time than the tram cars in that the tram cars run on schedule?

Mr. MASTEN. The electric mail cars run on absolute fixed schedules which require their employment in both directions and at a good rate of speed—6, 7, 8, and even 10 miles an hour in the outlying districts, and at a very low rate, approximately 1 cent per foot per mile; that is, a 20-foot car costs 20 cents per mile run.

The CHAIRMAN. A motor car would not cost anything like that, would it?

Mr. MASTEN. The cheapest service we have of motor cars is 22½ cents in the districts of upper New York. In St. Louis it was 30½ cents.

The CHAIRMAN. Then that system is more expensive.

Mr. MASTEN. More expensive than the electric mail cars.

The CHAIRMAN. Would it be as prompt or as quick as the other?

Mr. MASTEN. Hardly as reliable. The electric mail-car service is only reliable on account of the operation of the mail cars being a part of the general operation for passengers, and it receives the same close attention from all of the inspectors of the company and the company's operators.

The CHAIRMAN. Suppose the motor cars were owned and operated by the Government; would that not be cheaper?

Mr. MASTEN. I think the one instance of use in New York at 22½ cents will not be secured again, because it was the attempt by a large corporation to secure a very hard test of the use of their cars, a hard test involving long routes and quite frequent operation, over half an hour.

Mr. MURDOCK. From where did those autos run?

Mr. MASTEN. They operate from the Grand Central postal station at Forty-fifth Street and Lexington Avenue up the East Side to Fordham station, about 10¼ miles up the west side to Washington Bridge; also about 10 miles from the Grand Central postal station.

Mr. MURDOCK. Would not that be a fair comparison now between those and the line which runs up the West Side of New York, a pneumatic-tube line? If the committee will notice, the line of autos passes along the East Side of Manhattan Island, and on the West Side of the island is a line of pneumatic tubes. Now, it seems to me that it would be a very fair comparison there on cost between what it costs by auto on the East Side and by pneumatic tubes on the West Side, difference of congestion of traffic being taken into consideration.

The CHAIRMAN. If these parties made a contract with the Government to move their mail, they necessarily expected to make a profit. Now, why should not the Government do it on its own account?

Mr. MURDOCK. There is no reason for saying that the Government can not do it as cheaply as a private contractor.

Mr. STEWART. In this case we would use our own power and employ the men now employed in the post offices and stations to some extent at least in handling the carriers, and we could reduce the cost there a little, although we would have to pay the men that we employ specifically for this purpose a higher rate per annum. We could not get help as cheaply as they do, but we could use our present employees to some extent on the tube service. We can double up a little.

Mr. MURDOCK. Mr. Masten, for the purpose of enlightening myself, and I hope members of the committee, I want to take you into actual operation of the New York postal system. If I drop a letter in at the general post office downtown directed to you at one of the prominent hotels on Times Square, and I put a special-delivery stamp on it, does it go into the tube?

Mr. MASTEN. Absolutely.

Mr. MURDOCK. If it is an ordinary letter with a 2-cent stamp on it, are there numerous ways in which it may reach you at the hotel on Times Square? First, may it get also into the tube, although it does not carry the 10-cent special-delivery stamp?

Mr. MASTEN. It will during the time the tube is operated. It is operated to cover all of the hours that the special-delivery service is in operation; that is, from 7 to 11 o'clock at night.

Mr. MURDOCK. Is there any possibility of that letter getting on an electric car and reaching its destination by electric car?

Mr. MASTEN. Not between the general post office and Times Square, because there is no electric-car mail service in New York City, and no electric automobile service except above Forty-fifth Street. There is some automobile service below Forty-fifth Street, between the post office and the Pennsylvania and the Grand Central. The contractor for the screen-wagon service has obtained permission and uses about 30 automobiles in that service out of a total of 150 equipment that he furnishes. About one-fifth of his equipment is automobiles, and that letter might, in transit between the main office down town and Times Square, go by automobile and not by the tubes.

Mr. MURDOCK. In any event, would it go by screen wagon?

Mr. MASTEN. It might go by screen wagon if carried during the hours that the tube is shut down; the five hours from 11 o'clock at night to 4 o'clock in the morning, but between 4 o'clock in the morning and 11 o'clock at night it would be carried by the tube. All of the first-class mail in New York is carried by the tube in local distribution in the city. The first-class mail which is not carried by

pneumatic tube is that for dispatch on the railroad lines out of New York. That is the excess of mail which the tube will not provide sufficient capacity for. It is the mail for dispatch on the railroads at the Grand Central and the Pennsylvania Stations. There we have a fixed time of dispatch, a fixed time of leaving the railroad depot, and we make the dispatches from the post office down town on Park Row and from the Hudson terminal at a nearby location by screen wagon and automobile up to the time that they can make the trip and connect with outgoing trains. After that time we make supplemental dispatches by the pneumatic tube, and that comprises the mail which is advanced by pneumatic tube, because up to the time of this last or supplemental dispatch the tube does not actually advance that mail going out on the railroad trains, because we fix it so that the dispatch is mailed in time to connect with the outgoing trains. We will take an example of the big mail train going out on the New York special, leaving at 9.30 o'clock p. m. for Chicago. The last available dispatch from the Hudson Terminal leaves at 8.35.

Mr. MURDOCK. Are you speaking of screen wagons?

Mr. MASTEN. Yes; of screen wagons. That mail leaves the general post office at 8.40, reaching the Grand Central at 9.15, about 40 minutes transit time from the post office. Up until 8.55 p. m. at the Hudson Terminal a supplemental dispatch is made by pneumatic tube, which passes through the main office, through Station D and Station F, and so on up to the Grand Central postal station.

Mr. MURDOCK. Being relayed at each station?

Mr. MASTEN. Yes; being relayed at each station, and reaching the Grand Central postal station at 9.15. It is relayed at the intermediate points, and each one of these intermediate offices makes dispatches also by tube to this same train on the New York Central line. That additional mail comprises between ten and twelve thousand letters every night. Those letters all make the Overland connection to California, to Los Angeles, Portland, and all the intermediate points, and every one of those 12,000 letters every night makes 24 hours' time, because the last available dispatch by other means has left the post office at 8.40 and the Hudson Terminal at 8.35. So that represents in that one particular case a gain of 24 hours in the late letters, which amount to 24 hours in time.

Mr. MURDOCK. You say that the number of letters nightly is something like ten to twelve thousand?

Mr. MASTEN. There are ten to twelve thousand letters after that supplemental dispatch.

Mr. MURDOCK. That is 40 minutes of very rapid dispatch there of the mail from the down-town section?

Mr. MASTEN. The Hudson Terminal commences this dispatch at 8.55. The post office will let the Hudson Terminal dispatch go through, and then they will dispatch theirs at 9 o'clock. Madison Station will make its dispatch after the last of the Station D carriers are through; then Station F will make its dispatch and they will go into the Grand Central station following in a continuous stream, so that the final carrier must be in at the Grand Central station at 9.15. The process of loading the pouches on the train consumes about 15 minutes.

Mr. MURDOCK. That is a very clear statement showing that the letter mail down town in the day gets expedition by reason of the pneu-

matic tube, but the mail which was dispatched in the boxes and the post office previous to 8.35 is not expedited by these tubes.

Mr. MASTEN. No. It was found in our investigations that over 50 per cent of the first-class mail dispatched in post offices in New York was for local circulation, and all of that receives expedition every day, because from the time it is posted in the letter boxes the collections are made every hour. It goes into the postal station, it is postmarked, distributed, and dispatched as fast as the distribution can be accomplished to its destination. That large and important local mail receives this constant treatment. There are stations in the city that have 10 carrier deliveries in the day; and the process of sorting out the mail in each one of the branch stations requires time before it can be taken out by the carriers for actual delivery at the house addresses. Its receipt at the stations and branch offices constantly, therefore, keeps the force employed and prevents congestion. I studied that question very thoroughly in the two and a half years that I was superintendent of mails in the Brooklyn office, where a city of more than a million and a half of population received all of its downtown mail by pneumatic tube and sent all of its mail by pneumatic tube. Use there had to be made entirely of the New York post office facilities, because Brooklyn has no railroad stations. The mail is all sent to New York and handled in connection with the New York mail, receiving the same treatment as the New York post office mail. The pneumatic-tube service there was of great advantage, because hundreds of dispatches made daily would be made by tube later than they could possibly be made by wagon or automobile.

The CHAIRMAN. You have had a great deal of experience, Mr. Masten. Now, there is a clause here reading as follows:

The present contract under which the tube companies are performing mail service will not expire until June 30, 1916. During that period there should be ample opportunity for companies to perfect the system and for the Post Office Department to observe the effect upon the postal service. Further, during that period it is possible that other methods of transportation may be developed, or improvements made, so as to change entirely the outlook as it now appears.

That was your conclusion at that time. I should like to get the benefit of your knowledge at this time.

Mr. MASTEN. The time since that inquiry was made has witnessed a marvelous development in the automobile industry, and its application to the business needs in the different cities, while before that it was largely for social use; but notwithstanding that very general development of the automobile for traffic purposes, its introduction in the post office has been very slow, because it has proven very expensive in operation. I should say that to-day the automobile was not in a condition of actual development for universal application to the postal service, except where the Government was prepared to go to very much greater expense in the handling of its mails than for horses and wagons. The greater expense is necessary in places, and is justified in places where the horse and wagon are not effective or efficient, but in a city like New York, where the pneumatic tube service covers all of the post offices on Manhattan and carries the important mail, it is not necessary to go into the automobile service, because the other classes of mail do not require expedition enough to go to any increased cost.

The cost of the horses and wagons has been increasing, so that now every mile of service by horse and wagon that is performed in New York costs, below Forty-fifth Street, an average of $38\frac{1}{4}$ cents per mile operated—big and little wagons. Advertisements are now pending for the receipt of proposals to perform the service for four years, and it is so arranged as to call for proposals to perform automobile as well as horse and screen wagon service. Within a short time we will know something more about the increased cost, since the lettings of four years ago for the screen-wagon service in that city. It is generally stated to our people that the cost will be greatly increased, and it is possible that the cost for the horse and wagon service will be so great that the automobile may be selected. We may get up to the point where the cost will be almost the same. Very much frequency in the screen-wagon service or automobile service makes it almost as expensive as the pneumatic-tube service. In our investigation it was found that it only cost for each carrier, supposed to contain 450 letters, a half cent a mile for their operation. Four hundred and fifty letters might be all the load that the screen-wagon service would have to carry on one of its trips, at a present cost of $38\frac{1}{4}$ cents for every mile traveled as against the half a cent for the pneumatic tube. When great frequency is necessary the pneumatic-tube service becomes, in its comparison of cost, very favorable.

Mr. STEWART. Advertisement by the department each year for wagon service has included a paragraph inviting the submission of proposals also for service by automobiles. Do you recall in how many instances the department has received such proposals?

Mr. MASTEN. I do not know of a single one that was voluntarily offered. We have had to go out and dig up those that have been secured.

Mr. STEWART. There are automobiles used to some extent in San Francisco.

Mr. MASTEN. There are two automobiles employed in San Francisco. We finally secured them in order to see if they would give an improvement that would justify a larger cost involved in their general installation.

Mr. STEWART. How about Los Angeles?

Mr. MASTEN. There are none there.

Mr. STEWART. And at St. Louis?

Mr. MASTEN. One company in St. Louis similarly secured after persistent efforts.

Mr. STEWART. But nothing in Chicago?

Mr. MASTEN. Nothing in Chicago. Several efforts have been made in Chicago, but never have been reduced to any definite form.

Mr. STEWART. We secured a renewal of proposal in Milwaukee and Detroit.

Mr. MASTEN. Yes; both at an increased cost after a term.

The CAIRMAN. Do you find that they can use the horse and wagon at all times where they could not possibly use the motor car; in times of snow and slush?

Mr. MASTEN. Yes; we then give an advance time to the horse and wagon contractor. Sometimes in very heavy storms we cut off one hour in the time of the advancing of the particular mail and give

the screen-wagon man an hour's extra time to get to the depot. If we did not have the pneumatic tube service the letters would have been delayed.

Mr. BLACKMON. In the business district of New York City how many mail deliveries have you?

Mr. MASTEN. Take the district at Times Square, which Mr. Murdock has referred to; they have 10 deliveries there. There are 10 deliveries also at all of the stations until you get to Eighty-fourth Street Station—Station W. Then above there they get 8 to Station L, at One hundred and twenty-fifth Street. Down in the Wall Street district they get 8.

Mr. BLACKMON. How many deliveries have they in the residential portion of New York City?

Mr. MASTEN. At One hundred and twenty-fifth Street in the business part of the district they get 8 and 7, and in the extreme limits they get 4.

The CHAIRMAN. What is the minimum?

Mr. MASTEN. Four in the upper part of the city.

Mr. MURDOCK. Mr. Masten, in your report formerly made to the Government on page 27 I find this notation under the subhead—

INADEQUACY.

Boston.—Between 6 p. m. and 6.30 p. m. and again between 10 p. m. and 10.30 p. m., on the line between the general post office and the South Station, the volume of first-class mail for dispatch is so large that 10 or 15 per cent is sent by wagon as a matter of convenience in order to avoid breaking bulk and repouching the mail; yet on this same line the postmaster reports that the total use of the tube is only 33 per cent of their capacity during the 24 hours of operation. Also at the particular time mentioned the capacity used between 6 p. m. and 6.30 p. m. is only about 60 per cent, and between 10 p. m. and 10.30 p. m. about 29 per cent.

Now, what is the explanation for that failure to use that tube's capacity?

Mr. MASTEN. It requires somewhat of a technical description in order to understand it, but we find that in actual practice we can not load the carriers. We can not tie out the mail and transport it over to the tube tables and load the carriers as fast as the operator can take them up and dispatch them. That is one of the principal reasons why we never have called for the extreme maximum service that was available; that is, 10 carriers a minute. We find that 4 carriers a minute is practically all that can be used. We can not get mail up to the end of the tube and into the carriers faster than about 4 a minute.

Mr. MURDOCK. Where is the weak point in that failure? Why can not you do that?

Mr. MASTEN. Each letter is sorted out in distributing cases to boxes representing post offices in railway post offices, and when filled, or when the time of closing arrives, these mails are taken out of one lot of pigeonholes for another and tied in bundles with facing slips on the top indicating their destination. As these are tied out, each distributor tying out his own cases, probably with the helper when the time of tying out comes, it is put into the baskets and these baskets are carried over to the tube tables. There, as far as possible, the separation for a particular train is retained.

Mr. MURDOCK. In actually tying out bundles from the pigeonholes does a package of letters, all for Chicago, Ill., for instance, go into the tube without being broken?

Mr. MASTEN. That identical package goes. That is the unit.

Mr. MURDOCK. The man at the end of the tube does not untie that bundle, but he puts this little package of letters into a carrier and away it goes?

Mr. MASTEN. He puts it into a carrier with other packages until the carrier is filled; then the lid is screwed on, the lever locked, and it is placed into the tube. About four a minute is the limit that we have been able to reach.

Mr. MURDOCK. As a matter of fact, you can not supply the tube with enough to keep it going, can you?

Mr. STEWART. The capacity is so great that it exceeds the capacity of the men at the cases.

Mr. MURDOCK. Why should any of the mail in Boston go from the post office to the South Station by wagon?

Mr. MASTEN. A very good illustration. The service in Boston is not only a service between the post office and the south station, or the post office and the north station, but it is a service from all the post offices connected. The mail that originates at one place is not all the mail to be handled, but at the particular hour that the main office is making a dispatch to the south station there is mail arriving at the north station, and in practice it has been the rule to send the carriers containing a particular dispatch together, so that at the other end, where the transforming of the mail is made from the carriers into the pouches and so on into the train, the mail will fairly be together, consuming less time for examination by clerks at that point, so that the post office uses a certain number of minutes; then the north station uses a certain number of minutes to get that mail in the same dispatch for the south station. In the process of accommodating both places we probably do not utilize every minute, and consequently we drop below the capacity of the tube to only 60 per cent that the postmaster reports is used. Now, some mails go in such a form that the work of pouching them at the post office can be done to the saving of clerical force at the depot post office, and intelligent management between those points would suggest that they should at the post office put those mails, when they are in that special quantity, in pouches labeled to their particular destination and dispatch them by wagon which is going at that particular hour to carry other mails. It is probably going earlier than the last dispatch by the tube, some five or six minutes earlier. There is always a later dispatch by the tube than by wagon. I think it is 20 minutes later between the post office and the north postal station, and the north postal station being an inconvenient place for the wagons to get in, congested streets between, and it requires a longer time for the wagons in transit.

Mr. MURDOCK. That is, both the Boston post office and the north station use the same tube to the south station, and while the Boston station will use the tube for a while, then it must give way to let the north station use the tube? While the north station is using the tube, some of it is pouched and sent by wagon?

Mr. MASTEN. That is my observation, and that is my belief. I have worked with these problems in organizing the work at the post

office so as to get intelligent use of the tubes, but, after all, the daily operation is in the hands of the postmaster and his superintendents, and I see it only occasionally.

The CHAIRMAN. You believe the tube has some advantages, then?

Mr. MASTEN. Yes; I do. I am consistent in that belief. I have seen a place for it and have recommended it in every commission that I have been put on.

Mr. BLACKMON. What improvements, Mr. Masten, have been made in this since you filed your report; that is, in the way of equipment, and so forth?

Mr. MASTEN. Mainly in confirming the use of certain kinds of machinery, which were begun about that same time, about the time of our report; in introducing, as I explained this morning, the use of rotary blowers instead of the piston compressors, and the use of certain open receivers instead of the other form of closed receivers; the use of a slightly different carrier of tougher steel and better construction has reduced the cost of it.

Mr. BLACKMON. In the event that the Government should undertake to extend this service, do you think there is anything in the suggestion that it would be advisable to have the tube so that you could use both tubes at the same time, which idea was brought out here this afternoon?

Mr. MASTEN. I have heard that story ever since 1896. It is very plausible in the mouth of an inventor, but it never has been worked out, and it is not capable to-day of being worked out. For instance, in every pneumatic-tube system there must be a steel carrier, or a carrier of some similar material, to contain mail, because to put it into the tube without being inclosed in some form of carrier would mean that it would be ground up by the friction in passing through the tube. The construction of these carriers, then, has always to withstand a large amount of use, as well as to stand the force of the shock in coming to a stop. As these carriers are used to contain the mail and continual use is necessary, they must again be returned. If you would employ the tube in that way between the post office and the Grand Central Depot in the same direction for 30 minutes you would have no carriers at your initial point to be used. So that in practice it has been found better to use your carrier and return it with mail or empty. There is one man in the New York system who sits at the telephone in Fifty-first Street constantly, whose task it is to get reports and oversee the distribution of the carriers, to supply carriers at the places where the mail is running heavy, and take them away from the places where it is not running heavy. It is a physical impossibility to operate a single line of pneumatic tube in one direction and have an efficient service at the same time.

The CHAIRMAN. You mean in two directions, do you not?

Mr. MASTEN. No; to operate it in only one direction and have an efficient service. It must be out and back, because your delivery of mail is not all at one point.

Mr. BLACKMON. When this carrier comes in loaded, you return it loaded?

Mr. MASTEN. We return it loaded if we have any mail at that particular time to dispatch; if not, we return it empty at the first opportunity.

Mr. MURDOCK. That is a freight-car proposition.

Mr. MASTEN. Surely; you can not have all your traffic in one direction; you have to have it both ways.

The CHAIRMAN. Mr. Masten, after further reflection there may be some other points that you think the commission should know of. We would appreciate it if you would keep in touch with Mr. Stewart, so as to let us know in the event there is any other information that you think we should have.

Mr. MASTEN. I shall do so.

Mr. BLACKMON. I would like to have Mr. Masten go with us when we inspect the tube service between the House Office Building and the Capitol.

The CHAIRMAN. That is a good suggestion.

Mr. MASTEN. I shall be glad to go with you on that occasion.

STATEMENT OF MR. R. G. COLLINS, OF NO. 2 RECTOR STREET, NEW YORK CITY, REPRESENTING THE UNITED STATES PNEUMATIC CO.

Mr. COLLINS. Mr. Chairman and gentlemen, we are here not at all in connection with the purchase of the existing lines. We were not exactly familiar with the scope of the investigation, but we wanted to be here to present any information you might desire in line with these larger tubes.

Mr. MURDOCK. In the hearing of 1908, which has been published as a document, I find in the report of the committee a paragraph as follows:

There have also appeared before the committee representatives of the United States Pneumatic Co., of 74 Broadway, New York City, with a definite proposition for the construction, for the operation, or for the sale of an 18-inch mail tube between the general post office and the Union Station at Washington, D. C. They say that the terminals and the carriers will be operated under patents owned and controlled by the United States Pneumatic Co. The system is operated on the vacuum system, for which they claim certain advantages.

What advantages other than the vacuum principle does your company claim that the existing tubes in Boston, New York, and Philadelphia do not have? What devices do you have in your system that they do not have?

Mr. COLLINS. None. The principal claim that we make is furnishing a larger tube than is practicable under the compressed-air system, and by furnishing a larger tube, permitting the carrying of anything that the Post Office Department handles without breaking bulk, and thereby saving considerable labor in sorting the mail at each end.

Mr. MURDOCK. Now, are there more than the three methods of the pneumatic-tube transmission that have been mentioned here, namely, compressed air, second and rotary wheel method, which Mr. Masten mentioned, and the vacuum proposition?

Mr. COLLINS. I believe there is an electric-car proposition, but we do not know very much about it.

Mr. MURDOCK. Does your messenger, or carton, or whatever it is called, travel on rails?

Mr. COLLINS. No; it travels on wheels of its own. It has wheels placed at each end of the carrier and projecting a very slight amount,

about half an inch, below the carrier itself, so that almost the full size of the tube can be utilized for this carrier.

Mr. MURDOCK. And you exhaust the air, then, in front of your transmitter?

Mr. COLLINS. In front of the carrier.

Mr. MURDOCK. Is there a tube of that kind in existence now between the House Office Building and the Capitol?

Mr. COLLINS. There is.

Mr. MURDOCK. Was it constructed after an appropriation had been made for it, or before an appropriation had been made?

Mr. COLLINS. I believe it was constructed after the appropriation had been made.

Mr. MURDOCK. Has it been paid for?

Mr. COLLINS. I believe so; yes, sir.

Mr. MURDOCK. Under whose control is it?

Mr. COLLINS. The operation of it, do you mean?

Mr. MURDOCK. Yes.

Mr. COLLINS. I do not think it is being operated.

Mr. MURDOCK. Why not?

Mr. COLLINS. I think appropriations have never been made for operating it. It was placed there for service between the buildings and very largely to give the public and every one interested an opportunity of seeing what the system meant and could do.

Mr. MURDOCK. Do you know how much it cost?

Mr. COLLINS. Do you mean what was paid for it?

Mr. MURDOCK. Yes.

Mr. COLLINS. The appropriation was \$1,000.

Mr. MURDOCK. The actual construction of it was far in excess of that, was it not?

Mr. COLLINS. But you asked me what was paid for it. Of course, that was merely a nominal sum.

The CHAIRMAN. What do you call it, a demonstration plant?

Mr. COLLINS. It was put in primarily for that purpose, I judge; but there it is, ready for use. It will carry now any mail except the very largest No. 1 sacks.

Mr. MURDOCK. What is the diameter of that tube?

Mr. COLLINS. Eighteen inches.

Mr. MURDOCK. And it is entirely serviceable?

Mr. COLLINS. Absolutely.

Mr. MURDOCK. It is now ready for operation?

Mr. COLLINS. It was operated this morning.

Mr. STEWART. Where do you get your power?

Mr. COLLINS. From the Government service, I believe.

Mr. MURDOCK. To whom have you appealed to have it operated, if to anyone?

Mr. COLLINS. I am not familiar with any of the details. I do not think that anyone has been appealed to to operate it. Of course, it is over there; and the company hoped, I suppose, that the service would be extended between all the different Government buildings; and I believe by means of a pneumatic service considerable money could be saved and considerable time saved; also a more satisfactory service inaugurated by using the pneumatic tube.

Mr. MURDOCK. In the testimony which I just read you there was a reference to the offer to construct a tube between the Union Station and the post office at Washington. Did anything ever come of that?

Mr. COLLINS. No; it did not.

Mr. MURDOCK. Did your company offer to construct a tube at Cincinnati, Ohio?

Mr. COLLINS. I think not; I am not familiar with any such offer, at least. That tube is 18 inches in diameter, and, as I say, it carries everything but a No. 1 mail sack.

Mr. MURDOCK. Do you subscribe to the proposition that has been repeated here over and over again that a perfect system of underground mail transmission in this country would consist of a tube for the quicker expedition of first-class mail and a second tube of larger diameter for the less expeditious dispatch of second, third, and fourth-class mail?

Mr. COLLINS. I do not know. That is a matter, perhaps, that could be more satisfactorily talked of by the Post Office Department. I can only say that we recommend a 24-inch tube, which is equally capable of handling the small first-class matter as well as the larger packages.

Mr. MURDOCK. Is the larger tube less expeditious than the smaller tube?

Mr. COLLINS. No; a schedule of 30 miles an hour can be operated very satisfactorily.

Mr. MURDOCK. What have you to say regarding the proposition that when at a relay station one of the larger carriers arrives, it makes it more difficult to transfer to another tube and move it on; thus increasing the cost of transmission and operation?

Mr. COLLINS. It is absolutely unnecessary. In handling the larger carriers the installation should be made, and undoubtedly would be made, in such a way that it could be performed just as quickly as the smaller carrier. I do not suppose that the larger carriers could be loaded and sent off in the tubes quite as fast on a test, perhaps, as the small carriers, but the carrying capacity in cubic feet would be considerable. I think the carrying capacity of a 24-inch tube would be 16 times that of an 8-inch tube with one half the number of carriers.

Mr. MURDOCK. Did you hear the testimony this morning?

Mr. COLLINS. No; only a small portion of it.

Mr. MURDOCK. Would there be an appreciable increase in the cost to the Government for terminals when a large tube is used as against the cost for terminals when a small tube is used?

Mr. COLLINS. Proportionately large, do you mean?

Mr. MURDOCK. Disproportionately large in the cost of terminals.

Mr. COLLINS. No, sir; there would not.

Mr. MURDOCK. I gathered from the testimony this morning that the larger tubes necessitate larger terminals and considerable more cost to the Government. Am I correct in that, Mr. Masten?

Mr. MASTEN. That is my belief.

Mr. COLLINS. That is what I mean by proportionately larger. Of course, the whole system of 24-inch pipes means 24-inch ways everywhere, where the 8-inch requires 8-inch, but there is no undue complication or unreasonably expensive apparatus necessary.

Mr. MURDOCK. You feel that your system could give the Government a 30-mile speed?

Mr. COLLINS. I think there is no question about that. The tube down here has been operated up to 90 miles an hour. Of course, that speed would not be adopted in regular practice. It seems to me the very fact that carriers only need be sent one-half as frequent—that is, with a greater headway between them—it would make it possible to operate at a greater speed than would be safe with an increase on a short headway.

Mr. MURDOCK. You are speaking on the basis that carriers at all times carry a full carload. Now, as a matter of fact, in the actual transmission of mail by pneumatic tubes, as I have gathered here, very frequently a carrier is not loaded to its capacity.

Mr. COLLINS. The actual capacity of a 24-inch carrier is about 9½ feet, and I used 8 feet because I believe there is no reason why the 8 feet should not be used.

Mr. MURDOCK. Is not this true about the larger carrier: That where the unit of transmission of mail in this country is a sack or pouch, there is not a greater economy in the transmission of mail in larger lots from place to place through a tube by reason of the fact that you do not break bulk as often and the separations are not as minute or frequent? In other words, on the score of the handling of mail, is not a larger tube more economical to the Government than a small one?

Mr. COLLINS. It seems to me that every time the bulk of a sack is broken it must increase the cost of handling the mail. At the same time, it would seem to me that a sack weighing about a hundred pounds is about a reasonable unit to be handled. In other words, I do not think it would be advisable to go much over that in the size of the unit.

Mr. MURDOCK. I do not know what the weight of an ordinary first-class letter pouch is.

The CHAIRMAN. Do you know, Mr. Masten?

Mr. MASTEN. The average throughout the country of paper sacks is less than fifty pounds; the maximum being 150 pounds.

Mr. STEWART. That is a paper sack. Is it the same thing for the first class?

Mr. MASTEN. Yes; it is the same thing for the first class.

Mr. COLLINS. It is usually considered nearly a hundred pounds.

Mr. STEWART. Not in the actual service.

Mr. MURDOCK. Would an 18-inch tube carry a mail sack containing 50 pounds of mail?

Mr. COLLINS. The 18-inch tube carries a No. 2 sack, I believe.

Mr. MURDOCK. Will a No. 2 sack contain 50 pounds of mail?

Mr. MASTEN. Yes; it would contain a hundred pounds of heavy mail; magazine mail.

Mr. MURDOCK. So the answer to my question is that an 18-inch tube will carry a pouch of mail containing 50 pounds of mail?

Mr. COLLINS. You have the answer.

The CHAIRMAN. Mr. Collins, I should like to have you tell the members of the commission all you know about this system.

Mr. COLLINS. It seems to me that another great advantage in the handling of mail would be the ability of the pipes. For instance,

suppose you are operating a double-tube line between the main station in New York and the Grand Central Depot, or any receiving and distributing point. These tubes can be operated in either direction with a very slight regulation by the operator, and the fact that a great bulk of the outgoing mail is received at the down town station within a comparatively few hours in the day means overwork on the carrying capacity, whatever it may be, on the lines of transportation during those few hours. Those tubes could be turned into the service for an hour, or whatever time might be needed, or, if an extra-heavy mail came in on the train, they could be both operated down to the main station. It seems to me that that would be another very great advantage, and that is absolutely practicable and very simple.

The CHAIRMAN. Where are your tubes in operation?

Mr. COLLINS. We have only one tube; the one between the House Office Building and the Capitol.

The CHAIRMAN. Suppose you were favored by the Government in any way, could you get a franchise from the authorities, say in New York City?

Mr. COLLINS. We have not advocated doing it in that way. We advocated the Government buying the system. The Government can buy the system and operate it.

The CHAIRMAN. Would you want to sell only the machinery to the Government?

Mr. COLLINS. Sell the lines installed and ready for operation.

The CHAIRMAN. In other words, you are manufacturers only?

Mr. COLLINS. Everything; manufacturers, contractors, and there is the tube ready for use. We have not considered a rental proposition because the Government can more easily get a franchise than a private individual, and the Government can operate it as cheaply as anybody else can.

The CHAIRMAN. How long have you been manufacturing your system?

Mr. COLLINS. The system here has been in operation. I believe, for over a year. During that time efforts have been made to extend the system, but it has not been extended so far.

Mr. MURDOCK. Is it your proposition to sell the Government the patents?

Mr. COLLINS. No, sir.

Mr. MURDOCK. Is it your proposition to construct lines for the Government?

Mr. COLLINS. Yes, sir; at a stated contract price.

Mr. MURDOCK. It is quite different from the proposition which we have had up before in these hearings, namely, the selling of already constructed plants to the Government.

Mr. COLLINS. Oh, yes; this is a new installation.

Mr. MURDOCK. You have no plants to sell?

Mr. COLLINS. No, sir.

The CHAIRMAN. What are the advantages you can offer the Government over what they have in use?

Mr. COLLINS. The large tubes present the advantages which I have named; the capacity of handling the usual units of mail without breaking bulk, and there is also an economy in operation; the

power consumed is less than with the compressed-air system, and there is a marked advantage in the ability to operate the tubes both ways.

Mr. MURDOCK. What do you mean by operating the tubes both ways?

Mr. COLLINS. In a double-tube line one tube would naturally be used going north and another one for the mail going south, and by operating them both ways it means such an adjustment of the terminals that they can both be operated north or south. That adjustment can be made by throwing a lever in half a minute, and the tube is then operated in the opposite direction.

Mr. STEWART. Do you operate them in both directions with the same set of machinery by the use of levers to change the connection, or would you have to have two sets of receiving and dispatching machinery?

Mr. COLLINS. We would advocate that any way for emergency. Either tube could be used as a single unit operating in both directions.

Mr. STEWART. Have you a tube constructed in that way now?

Mr. COLLINS. Yes, sir; this tube here can be operated in either direction.

Mr. STEWART. What is your idea about operating a larger tube than an 18-inch tube with this system that you have? Would it be practicable?

Mr. COLLINS. Absolutely so; yes. I think, of course, the only question regarding the reasonable enlargement of the size is the practicability of getting the tube through the street. I am speaking now of New York and congested parts of New York, where, I believe, a 24-inch tube is about the limit that can be put through the street.

Mr. STEWART. Has this pipe been operated experimentally here?

Mr. COLLINS. Yes, sir.

Mr. STEWART. How long at one time?

Mr. COLLINS. I really could not tell you that. It has been operated a great many times, and it has been put in operation at any time when any one has come there to see it operated. I think that is a pretty hard test on the system.

Mr. STEWART. How much headway would you be able to allow, or how much is required in the operation of your tube line?

Mr. COLLINS. We would advocate about 20 seconds. It could be operated, perhaps, in 15 seconds, but I do not think there would be any need of it. We can safely say 20 seconds.

Mr. STEWART. Now, in operating your carriers on a headway of 20 seconds you would have to have some facility in your station to take care of them. What do they weigh?

Mr. COLLINS. A 24-inch carrier would weigh about 450 or 500 pounds.

Mr. STEWART. You would have to have some means of getting rid of those carriers so as to make room for your arriving carriers. Have you anything of that kind in this plant?

Mr. COLLINS. We have, to a very small extent. It is nothing but a heavy round pipe. These carriers roll. You can move them with very slight effort on their own wheels, and they can be transported

down these rollways so far as you want to. They will roll and can be gotten out of the road very easily.

Mr. STEWART. If you were operating those carriers on a 20-second headway, of course the space required to care for your carriers would be considerable as compared to the 8-inch tubes, where the men take them out and dump the mail; so that would be an item of considerable importance in considering the feasibility of a tube of that kind.

Mr. COLLINS. Yes; except that the capacity of one carrier is much greater. One is 9 cubic feet and the other is a quarter of a cubic foot. That fewer number of units would have to be taken care of.

Mr. STEWART. But they would have to be taken care of during a period of time which would admit of the transmission of a large amount of mail. For instance, if you have a lot of bulk mail to go to a station, which would ordinarily be sent out by No. 1 wagons, and you attempted to put that through an 18-inch tube, you would have to have enough space in your receiving station to care for your carriers as they come in on a headway of 20 seconds.

Mr. COLLINS. But, perhaps, you would find it was not necessary to send them on a headway of 20 seconds to more than equal the capacity of the remainder.

Mr. STEWART. You have not figured out the capacity, have you?

Mr. COLLINS. I have not gone into it in just that way. I do not know what the average load of mail is.

Mr. MASTEN. We carry 70 full sacks of mail in a two-horse wagon.

Mr. STEWART. The company that offered the department a contract for a service at Cincinnati is proposing to operate their tubes by the vacuum system. Is that the same patent that you control?

Mr. COLLINS. I do not know anything about that concern.

Mr. STEWART. Then your patents are not exclusive patents, so far as the rights on the vacuum system are concerned?

Mr. COLLINS. I do not suppose anyone could patent the vacuum system. It is the receiving and dispatching apparatus which is patentable and which we do patent, and, of course, there are many ways of doing that.

Mr. STEWART. Have you figured on the cost of constructing and installing a system; that is, the cost per mile?

Mr. COLLINS. In a general way.

Mr. STEWART. Could you submit your figures to the commission?

Mr. COLLINS. That, of course, would vary in different localities. For instance, the cost of street construction in New York City is very high as compared to what it would be in Washington. The cost of pipe and such things are practically parallel wherever they are found. I should say that in New York City the system would run around \$225,000 per mile of double 24-inch tube.

Mr. STEWART. Twenty-four-inch tube?

Mr. COLLINS. Twenty-four inch tube; yes. We think the 24-inch tube is better, because it will take anything that the department has.

Mr. STEWART. Have you any figures as to the cost of operation?

Mr. COLLINS. No; we have not. I think that before that could be determined the particular installation or plan that was talked about should be somewhat known. The general principles of power required for propelling cars by a vacuum system is considerably less than by other systems—compressed air, for instance. Then, of course, the carriers are heavier to handle and they take a little more labor,

but as against that there is the lack of necessity for breaking bulk of these mail sacks. I think they would show a marked saving over the use of the smaller tubes.

Mr. STEWART. What is your position with reference to the company?

Mr. COLLINS. I am the chief engineer.

Mr. STEWART. I wished to know whether you are a man of technical knowledge.

Mr. COLLINS. Yes; I am an engineer by profession.

Mr. STEWART. I heard it claimed that a tube of large dimensions, considerably larger, say, than your 18-inch tube, would not be practicable if operated by the vacuum system. What do you think of that?

Mr. COLLINS. Will you kindly repeat that question?

Mr. STEWART. I have heard it claimed that a tube of a larger dimension than your 18-inch tube for instance, say, a 24-inch tube or a 30-inch tube, would be found to be impracticable with the vacuum system. I understand you use the vacuum system. As a technical man, what do you think of that?

Mr. COLLINS. I can see no reason why it should not.

The CHAIRMAN. It has not been demonstrated yet, however.

Mr. COLLINS. But there are no principles involved which would make it impracticable. The power by which the 18-inch carrier is propelled is simply the pressure of the air, stronger on one side than it is on the other. Now, the larger the carrier the more square inches it has. Therefore the more pressure would be exerted by the same amount of air in operating these carriers by the same amount of air; and in operating these carriers the air pressure is only about an eighth to a quarter of a pound; that is, the amount which the air pressure is reduced is only about an eighth to a quarter of a pound, so that there is an enormous range of possible increase between that and 14 or 15 pounds to the square inch. Of course, the curves must be so proportioned that you can go around them.

Mr. MURDOCK. If the Government should purchase the tubes already in existence in these four or five large cities, is it mechanically possible to apply the vacuum process to these tubes in their operation?

Mr. COLLINS. I do not know that I would be qualified to speak of that. Of course, it would mean the entire terminal rearrangement. The type of carrier is not the same. One operates with a frictional contact and the other runs on wheels.

Mr. MURDOCK. I asked that question for this reason: If the Government should at the present time take over these existing systems and as the years roll by we should discover that the vacuum system was by far the more economical of the two, we might buy a system that was antiquated. We might find ourselves in the position of having bought a system that was antiquated. You believe that the vacuum system will supersede the old compressed-air system, do you not?

Mr. COLLINS. I believe it is more economical. I believe it permits of the use of larger tubes, and I believe that the use of larger tubes is desirable for the reasons that I have already stated.

Mr. MURDOCK. You stated a few minutes ago that in the use of a larger tube there would be the necessity of less frequent dispatch of carriers, did you not?

Mr. COLLINS. Yes, sir.

Mr. MURDOCK. Then it naturally follows from that that the larger the tube the less of the capacity of the tube is used in a given number of hours?

Mr. COLLINS. I do not know.

Mr. MURDOCK. In other words, we find here in this hearing that there are some tubes used to only 2 per cent of their capacity. Now, if we have an 8-inch tube, as we have running from Roxbury to Uphams Corners in the suburbs of Boston, and we should substitute for that tube an 18-inch tube, would that further diminish the use of the capacity of that tube?

Mr. COLLINS. You would further diminish the use of the tube; you would not further diminish the capacity of the tube.

Mr. MURDOCK. I mean you would further decrease the use of the tube as to its capacity.

Mr. COLLINS. Certainly; your operations would be fewer and your power consumption thereby would be lessened, and you would have a great capacity for handling more mail through that section.

Mr. MURDOCK. Doesn't it follow from that that the larger the tube the less of its capacity you use on an equal amount of mail? In other words, I can not get it through my head that where we maintain a tube at the rate of \$17,000 a year, which is an enormous expenditure per mile, that we should get only 2 per cent of the capacity of that tube out of it.

Mr. COLLINS. Should that be measured by the capacity or the use of the tube? Should it not be measured for the handling of that large mail over that distance, and how much it costs to handle it by wagons, and how much it costs to handle it by the mail tubes?

Mr. MURDOCK. It is true that all those elements enter in. But, as a matter of fact, it does not seem defensible to me that only 2 per cent of its capacity should be used.

Mr. COLLINS. It would depend on what your rental was and what your means of carrying the mails by other service happened to be. The measure of the worth of that tube is the cost of carrying that by other means, and not whether that tube is being worked or not. If you have only enough mail to keep that tube going 2 per cent of the time, you know what it costs to carry it a year and what it costs you to carry it by some other means. Which is the cheapest?

Mr. MURDOCK. Undoubtedly the carrying by wagon service would be the cheaper, but here is a matter of expedition which the tube gives and which the wagon does not give. Now, say we construct one of your 18-inch tubes for a mile between a prominent post office and a prominent terminal; then, if the Government is to make a profitable use of that tube, the nearer it can use that tube to capacity the better off the Government will be. Is not that true?

Mr. COLLINS. Yes.

The CHAIRMAN. It is greatly a question of locality, then, is it not?

Mr. MURDOCK. Does not the whole thing then resolve itself into the question as to the bulk of mail that is offered?

Mr. COLLINS. How do you pay for carrying the mails—by the hundred pounds or by the year?

Mr. MURDOCK. On the wagon service we pay by contract.

Mr. COLLINS. And the other way you pay by the year. How does that resolve itself in cost per hundred pounds as compared with the

wagon service—without considering this expedition and certainty and all that?

Mr. MURDOCK. As a matter of fact, the wagon service between station and post office is used almost to its capacity. The contractor makes a contract with this Government to carry the mail to and from the station and post office. He equips himself with so many wagons and so many horses and those horses and wagons are passing continuously between the station and the post office. He is working to 100 per cent capacity. Now, we will say here is an 18-inch tube and it works only 2 per cent of its capacity. Even taking into consideration the matter of expediency, I believe that it is a loss to the Government, or at least it seems a loss to the Government, to maintain a tube when it does not use the tube continually.

Mr. COLLINS. On a rental basis or a purchase basis?

Mr. MURDOCK. On the rental proposition.

Mr. COLLINS. That would be governed by locality very largely—locality and the need of special service in that locality and the bulk of mail handled. On a purchase proposition it only means a consideration of the amount of money invested. When you want it you want it very badly.

Mr. MURDOCK. But a ton of mail sent from the Washington post office to the Union Station in the city of Washington could be sent quicker through a tube than by a wagon.

Mr. COLLINS. Yes, sir.

Mr. MURDOCK. Do you think that 2 tons could be sent quicker by tube than by wagon?

Mr. COLLINS. I would want to do a little paper work first before answering that question.

Mr. MURDOCK. I want to find out where you put a dividing line on an 18-inch tube.

Mr. COLLINS. Certainly one unit of mail can be handled quicker and more economically by tube than it can by wagon. When you get beyond the carrying capacity of the tube you want another tube. You do not want to go back to your wagon. At least that is the way it seems to me.

Mr. MURDOCK. That is a good tube answer.

Mr. COLLINS. Of course, we are presupposing that you have enough mail to make it worth while to put in a tube at all. Certainly, having a tube in, you can handle it cheaper by the tube than by the wagon.

Mr. MURDOCK. There is a point where a bulk of mail passes through a tube. The last part of a certain cargo of mail is not expedited when you attempt to pass it through a tube.

Mr. COLLINS. Then what becomes of the first part that has come through?

Mr. MURDOCK. It has been very rapidly expedited.

Mr. COLLINS. What has become of it?

Mr. MURDOCK. In the ordinary course of postal transition it has been moved out.

Mr. COLLINS. Yes; and it is either being assorted by the men in the car or it is somewhere on its way. In the case of a wagon that is all dumped on those men at once. That is a great consideration in favor of the tube.

Mr. MURDOCK. I see it is an element, and I am glad you called my attention to it.

The CHAIRMAN. They can go ahead and do some work on it.

Mr. COLLINS. Certainly. It gives them something to work on without waiting for a whole wagonload of mail to be dumped on them.

Mr. STEWART. I noticed in the report of the former commission a letter from your company, dated February 23, 1908, and signed by John Henry Hulbert, assistant secretary, in which it is stated that you could construct a double line of 18-inch tubes here in Washington between points about 1.39 of a mile distance for \$225,000, which would be about \$160,000 a mile. Do you recall that?

Mr. COLLINS. I am not familiar with that.

Mr. STEWART. Of course, construction in Washington would be cheaper than in a city like Chicago or New York.

Mr. COLLINS. And an 18-inch pipe would be cheaper to construct than a 24-inch pipe, but I think with the slight difference in cost the Government would better put in a size tube to carry anything they have.

Mr. STEWART. Your proposition is to build the tubes and turn them over to the Government?

Mr. COLLINS. Yes, sir.

Mr. STEWART. You have nothing now to sell.

Mr. COLLINS. No, sir; nothing.

The CHAIRMAN. Are you engaged in any other manufacturing business in connection with vacuum tubes?

Mr. COLLINS. No, sir; this is our line of work.

The CHAIRMAN. You are waiting for orders, then?

Mr. COLLINS. That is the point exactly, sir. We believe we can save the Government considerable money. We can more efficiently handle the mails.

Mr. STEWART. Have you ever compared the cost of your system as to construction or operation with a system of tunnels in which cars would be propelled by electricity?

Mr. COLLINS. I am not qualified to speak of the other man's cost, nor have I had sufficient details as to his movements of operation and construction of his cars, etc.; how much of the full size of the tube he would use; how much he would gain by it; whether he would have any greater gain in a 30-inch tube with that method of carrying over our method in a 24-inch tube. I do know this, that I have had a great deal of experience in putting structures in New York streets, and it is very difficult to get anything bigger than a 24-inch pipe in there.

Mr. STEWART. I know it is very difficult to get an 8-inch pipe through places in New York. What I was trying to get at was whether you had ever made the comparison of cost of construction of your system with the system that has been spoken of from time to time of a tunnel in which there would be two tracks upon which a 6-foot car would be run.

Mr. COLLINS. What size tunnel?

Mr. STEWART. It would have to be 7 to 9 feet wide in order to have a double track.

Mr. COLLINS. Do you mean in New York City?

Mr. STEWART. Anywhere.

Mr. COLLINS. That, of course, differs very much as to where you are going to put it.

Mr. STEWART. New York City would not be a very good example, because the condition there is very unusual.

Mr. COLLINS. It is almost prohibitive. I think that in almost any city where these larger amounts of mail are handled, as in parts of Chicago, it would be mighty difficult to get a 6-foot tunnel. In the outlying districts it would be feasible, but there you would not be carrying enough mail to make it worth while.

Mr. MURDOCK. A rental of \$17,000 a year per mile does not tempt you to take advantage of any of the Government contracts offered?

Mr. COLLINS. No; I do not think it does. I do not mean by that that the cost is not enough for operating our system, but I do not see anything to be gained by either party in doing it. There is a working plant over there. That is an ocular demonstration of what can be done with the system of an 8-inch pipe. The Government knows what it can buy that system for, and knows what it will cost to operate it. There is very little uncertainty about it. Certainly a margin could be left for increasing in cost of operation. It would be a very small amount per year.

Mr. MURDOCK. We have about 50 miles of tubes already constructed in this country. It is owned by people other than the Government. They built those tubes on the idea that they could make money out of them at a rental of something like \$10,000 a year. Now they say that a rental of \$17,000 a year pays them about 6 per cent on their investment, but that the investment is not considered a good one by the public because there is no hope that the \$17,000 annual rental will pay a fair interest in return and amortize the principal. Is the philosophy that they have recited the reason why people back of your company do not care to take any of these Government contracts?

Mr. COLLINS. Absolutely not. We believe that the Government can finance the construction of a tube for which it eventually has to pay cheaper than we can. We believe it can get franchises through the streets cheaper than we can. It can operate the system cheaper than we can. It can operate it to suit itself. What the Government wants to be sure of is that it is getting a system that is reasonably fool proof and will do their work. There is no reason why we should remain in the proposition at all. We are perfectly willing to furnish men for any reasonable time to break in the department men and see that things are handled properly, but if we finance it we have got to amortize it in the period of the franchise, whatever that may be, or of the lease with the Government, but there is no insurance about that being renewed.

The CHAIRMAN. You are only in the manufacturing business?

Mr. COLLINS. We have a tube which we believe the Government needs, and we believe that the cheapest way for the Government to get it is to buy it.

Mr. MURDOCK. And you are not in the field to rent it to the Government?

Mr. COLLINS. No, sir.

The CHAIRMAN. You are manufacturers, and that is where you stop?

Mr. COLLINS. Yes, sir.

Mr. BLACKMON. Have any of the members of this commission ever seen the tube in operation between the Capitol and the House Office Building?

Mr. STEWART. I have seen it, but not while it was in operation.

Mr. COLLINS. It is there, and Mr. Burton can operate it for you.

Mr. BLACKMON. I should at some time or other like to see it operated.

The CHAIRMAN. I suggest that we go over there at the first convenient time and see it in operation.

Mr. COLLINS. It is all ready; it is in condition now to turn on the machinery and operate it.

Mr. Burton will show it to you at any time. It speaks for itself stronger than anyone else. It is simple and practicable and fool-proof, and certainly has carrying capacity.

The CHAIRMAN. If it proves a success, the next question is, Is it as cheap to operate as the system now being used?

Mr. COLLINS. Do you mean from a power point of view?

The CHAIRMAN. From the standpoint of saving to the Government in dollars and cents.

Mr. COLLINS. I think that it would be found that the Government could operate the 24-inch tubes for no more money than they are paying for the rental of the 8-inch tube.

The CHAIRMAN. Then you are not prepared to say that it is any cheaper, except that they can carry more bulky mail?

Mr. COLLINS. I say it would cost at least no more. I think it is likely that there would be some saving. Certainly the cost of operation of this 8-inch tube looks like a big sum of money, but when you consider that they have developed this system and that it will probably be taken away from them at the expiration of their lease. I do not think the rental price is so unreasonable as it seems.

The CHAIRMAN. There is no connection whatever between your company and the other companies?

Mr. COLLINS. None whatever. I suppose, of course, the commission in considering future extensions has in mind the necessity of this parcel-post increase. That is going to increase in bulk, I suppose, very much the work of the department, and a large tube that is able to take care of that work would certainly be almost a necessity.

The CHAIRMAN. That is a factor to be considered.

Mr. COLLINS. It is a very important one, I should think.

The CHAIRMAN. Yours is a New York concern, is it not?

Mr. COLLINS. Yes, sir.

The CHAIRMAN. Is it a corporation?

Mr. COLLINS. Yes, sir. We would like very much for the commission to see the plant in operation.

The CHAIRMAN. I think your wish will be gratified. There will be no trouble about that. Are there any other gentlemen present with you who would like to be heard?

Mr. COLLINS. I think not.

The CHAIRMAN. We are very much obliged to you for your information.

**FURTHER STATEMENT OF MR. R. G. COLLINS, OF NEW YORK CITY,
REPRESENTING THE UNITED STATES PNEUMATIC CO.**

MR. COLLINS. I think the first consideration in a tube system should be the reliability, and I just want to remark on the general principles of it.

It is a carrier on wheels, which are roller bearing, moving with very little friction. It is not a tight fit in the tube. From terminal to terminal there is practically nothing to stick on, and no lubrication is required. The carrier is large enough to be securely locked, and even with registered mail it could be locked with any secure lock that might be put on it. As to its being reliable, it is made available for any deliveries they may care to send through it.

Another point in it is its ability to carry anything, any size which the department may be called upon to handle, even including the parcel-post regulations. I find on an examination of the report of the committee of 1909 that practically no second, third, or fourth class matter is handled in the tubes. It is almost entirely devoted to the first-class matter. It seems to me that if any economy is made by handling first-class matter in a tube, it is even more important to have that cheap form of transportation for matter which has to be handled at a lower rate.

I made up a statement of the cost of operating this system per ton per mile. The cost of operation on a 20-second headway—you saw the other day a 15-second headway—including operators, power, repairs, and general expenses, for the two tubes is about $7\frac{1}{2}$ cents per ton-mile. I do not know whether you gentlemen have any idea of what the cost of operation by the other tubes is or not, or how that compares with it.

THE CHAIRMAN. We have not seen the figures yet.

MR. COLLINS. I made up statements, basing them on that same committee's report, which show the cost of transportation to be \$1.04 per ton-mile.

MR. BLACKMON. \$1.04 by what system?

MR. COLLINS. By the 8-inch tubes. The cost of transportation by screen wagon, based on the contract price in New York, which I believe is $38\frac{1}{4}$ cents per ton-mile, is about 35.4 cents per ton-mile, showing that the cost of transportation in the 24-inch tubes is considerably lower than even the screen-wagon transportation.

Another thing about that is that, of course, the greatest economy in the transportation of the matter is in handling it to its fullest capacity, in getting matter off to a train, or something of that kind. On the other hand, the amount of power required to propel the carrier in a vacuum system is so much less than that required in a compressed air system that you can handle a single letter in one of those big carriers for as little as you can in an 8-inch tube, so that it would seem that it fitted almost every needed department, even in economy. In that report to which I refer there were one or two evidences of inadequacy of the present tubes recited, one of which was the handling of a certain amount of mail from the post office in New York to the three trains which left the Grand Central Depot between 9.30 and 11. It is recited there that 206,000 pieces of mail were sent to these trains by wagons, and 5,500 pieces by the tubes. Those 206,000 pieces mean about 10 minutes' work for these tubes. That is merely an illustra-

tion of the availability of it, where the present 8-inch system is inadequate. The tubes, when they are working to their full capacity, can handle, of course, the volume of first-class mail, as great as it is, in considerably less time than the 8-inch tubes, and there would be that much more time, of course, available for handling second, third, and fourth class matter at about the same price per ton-mile.

The statement was made the other day in the hearing, after we had left, that it was impracticable to reverse the direction of operation in these tubes; that it is all right from an inventor's standpoint, but it could not be done practically on account of getting all your means of conveyance, your carriers at one end. That is a good argument, perhaps, in the case of 8-inch tubes. Take the 210,000 pieces, for instance, to three trains, and we will assume that 70,000 pieces go to a train. It would take about 160 carriers of the small class to handle that. Of course, you could hardly accumulate that many at one end, but in the case of the large carriers, 10 carriers carrying the whole shipment for one train, it is perfectly possible to accumulate that many extra carriers, if necessary, in preparation for that shipment at that time of the night, in addition to which it happens in the case recited just about the time these carriers are getting up with the heavy shipment in one direction there is a heavy mail train coming in, and they would undoubtedly have the same bunch of carriers to take the heavy shipment down to the post office.

Those figures I have written out and would be glad to submit for your consideration.

The CHAIRMAN. Give them to the stenographer.

Mr. BLACKMON. Speaking about the service being carried on in the same direction, you mean where you have two lines of tube, do you not?

Mr. COLLINS. Yes.

Mr. BLACKMON. The one we looked at the other day over here is only a single line?

Mr. COLLINS. That is all, only a single line.

Mr. BLACKMON. Your idea is that if that line is paralleled by another tube, you could send mail in the same direction in both tubes?

Mr. COLLINS. Yes; at such a rush period as recited, for instance, in that report, where three trains are leaving in a comparatively limited space of time. Every time those carriers came back you saw that direction of the operation reversed, and it evidently is not a very difficult matter, nor does it take a very long time to do it; and, of course, if that lot of mail were to be shipped in one direction, and if the time were short, both tubes could be operated in that direction; and undoubtedly, as the requirements of the system increase, they at many times would be.

I heard in the discussion the other day about the parallel systems and the radiating systems of handling the mail with these tubes. It seems to me that another great advantage of having a reversible tube would be to take care of the situation which is to be found probably to a greater degree in New York than in any other city that I know of, where there is a long line with a lot of stations on the line; the initial section is overworked, and the matter to the far stations has to be rehandled at each one of the intermediate stations, put on into the next section. If a double tube were installed, there would be no

reason why one of those tubes could not have a terminal, say every third or fourth station, the other tube having a terminal at each station.

In that way economy in handling the matter to the far-off point would be increased as well as the time occupied in the trip very much cut down, and at the same time the intermediate stations would have all the advantage of communication with each other.

The CHAIRMAN. There are a great many technical questions involved, and I believe the commission will at some time employ a competent engineer to make a separate report.

Mr. COLLINS. As to the particular matter of the principles involved in this system?

The CHAIRMAN. Of all systems.

Mr. COLLINS. I mean, of all systems.

The CHAIRMAN. Yes.

Mr. COLLINS. I think that we would all welcome that.

The CHAIRMAN. I think the commission should see their way clear to appoint some competent man to make an independent investigation in that direction.

Mr. COLLINS. I am sure we would all welcome an investigation of that kind.

The CHAIRMAN. Is there anything more?

Mr. COLLINS. No; that is all.

The CHAIRMAN. We are much obliged to you.

Mr. COLLINS. I thank you, Mr. Chairman.

UNITED STATES PNEUMATIC CO.,
PNEUMATIC DISPATCH TUBES,
New York, N. Y., December 10, 1912.

HON. SIMON GUGGENHEIM,
Chairman Committee on Mail Tube Extension,
United States Senate, Washington, D. C.

SIR: In considering the question of extending the system of pneumatic tubes for the transportation of mail and parcel post matter we desire to direct the attention of your committee to the system of large tubes furnished by this company.

The advantages of tube over vehicle transportation for mail service has, we believe, been thoroughly demonstrated, the main points of superiority being—

Expeditious and reliable delivery of the mail regardless of conditions of weather or street traffic.

A continuous delivery of mail to the clerks at the terminal point, permitting continuous work by them instead of the lost time waiting for the arrival of the wagons and the necessary extra effort to handle the large amount then received. By this continuous delivery a smaller number of clerks is required to handle a given quantity of mail.

A decided saving in cost of transportation.

A greater security while in transit.

We believe, however, that the greatest possible degree of efficiency and economy is not obtainable in using tubes of the size now in general use, i. e., 8-inch diameter.

The tube system best suited to the requirements of the service should be—

Simple and substantial in construction that it may be absolutely relied on at all times.

Easily operated and not requiring particularly skilled men for its operation.

The system should be so designed that a carrier large enough to contain any sack or package that the department may be called upon to handle can be transported in a tube of minimum outside diameter, which must be considered on account of the expense and difficulty attached to constructing the tubes in streets crowded with subsurface structures found in most of the streets and localities where the tubes are most needed.

The system should be so designed that the tubes may be quickly adjusted for operation in either direction to afford the additional carrying capacity required in the rush periods, met with in the daily work of the department.

The system should be economical in power requirements.

The requirements of the Parcel Post Service should be particularly considered in determining the size and efficiency of the carrier.

Advocates of the 8-inch tubes have stated that the practical limit of tubes operated by compressed air is reached in that size, and this statement is undoubtedly true.

However, it has been practically demonstrated that larger tubes can be operated satisfactorily and most economically by exhausting the air (usually spoken of as the Vacuum system). An inspection of such a tube in operation between the Capitol and the House Office Building will show an 18-inch tube with simply constructed and operated terminals operating in a thoroughly satisfactory manner.

We believe that the requirements of the postal service as to capacity of carrier will be fully met by using 24-inch tubes in which the carrier is propelled as in the 18-inch tube just mentioned.

The construction of the tubes and terminals is simple, strong, easily operated, not easily put out of order, and subject to a minimum of wear.

In 20 seconds the direction of travel in either tube can be reversed, permitting the sending of carriers in either direction, as required.

The tubes, being operated by exhausting the air ahead of the carrier, are admittedly the most economical in power consumption.

We believe that the Government can operate a tube system of its own for much less than it can be operated by a private corporation, for several reasons, among which are:

The cost to the Government, of the money invested, is much less.

The Government can easily secure a franchise for an indefinite length of time, whereas the corporation has no assurance of a renewal of its lease, and must therefore amortize the whole investment in the term of the lease.

These, with the administrative expenses, legal expenses, etc., are the heaviest items in the expense of conducting the business by a corporation, and are not necessary to the conduct of the business by the Government.

We therefore propose to construct these tubes for the Government for a stated sum, the operation to be conducted by the Government.

In view of the additional matter which must be transported in the parcel-post system, as well as the economies in mail transportation above mentioned, we believe that the interest of the postal service would be most advanced at this time by beginning at once the construction of a system of large pneumatic tubes, to be owned and operated by the Government.

As a beginning, the mail centers in the large cities at which the most mail and parcel matter is handled should be connected by tubes, as, for instance:

The Hudson Terminal Station, in New York City, to the Pennsylvania Railroad station at Thirty-second Street (with a steamship delivery point at Twenty-third Street and Twelfth Avenue, or that vicinity); from the Pennsylvania Railroad Station to the Grand Central Station; from there to One hundred and twenty-fifth Street and Third Avenue; from there to the proper central point in The Bronx.

From these last points mentioned, radiating systems could be added as may be considered advisable.

A connection should be made to Brooklyn centers from lower Manhattan.

The difficulty of installing structures in the streets of the large cities is increasing yearly, with the attendant increase in expense of construction. This is particularly true in the localities where postal tubes as a means of transportation are most needed.

The necessity for such tubes is generally recognized, and a great deal of expense for construction will be saved by starting such a system at once, as well as securing the obvious economy in transportation of postal matter at an early date.

It has been suggested that a new down-town post office should be built in New York City. This would take at least five years, and there is no necessity for delaying tube construction for that length of time.

The line between the Hudson Terminal Station and the Pennsylvania station could be so laid out that connecting up the new down-town station when con-

structed would be a matter of relatively small expense as compared with the gain from pneumatic-tube service during the intervening years.

We urge that some such plan as this be begun at an early date.

We attach a statement showing some points of comparison between the two systems and invite your attention particularly to the cost of transportation by each system.

Respectfully,

UNITED STATES PNEUMATIC Co.,
By R. G. COLLINS, Jr.,
Chief Engineer.

CLAIMS MADE FOR SYSTEM OF 24-INCH TUBES OPERATED BY THE VACUUM SYSTEM,
AS COMPARED WITH 8-INCH TUBES OPERATED BY COMPRESSED AIR AND TUBES
IN WHICH ELECTRIC CARS ARE OPERATED.

As compared with 8-inch tubes, the 24-inch tubes are more reliable, for the reason that the carrier runs on roller-bearing wheels and can not become hung up between terminals.

In the 8-inch tube the carrier, fitted with packing rings and sliding in a greased tube, frequently gets stuck, causing a delay and frequent damage to mail matter.

In the 24-inch system the terminals are strongly constructed, simple, and easily operated, no parts subject to undue strains or liable to much wear; they can not be easily damaged by careless operation.

Practically no air pressure is used in the tube.

The carriers are strongly constructed, with nothing to wear or break.

No lubricant being used, there is no danger of damage to postal matter from oil or grease, and the destination point can be clearly made out as the carrier progresses.

The carriers are large enough to be fitted with a dependable lock for registered or other mail matter when desired.

Carrier capacity for containing mail in sacks, causing an economy in labor from not having to remove the mail matter from sacks in preparation for transit and resorting and resacking the mail at the tube terminal.

Carrier capacity for containing any piece of parcels post or other matter the postal service may be called upon to handle. Neither of these features are possessed by the 8-inch tubes.

Although one letter can be transported as cheaply by the 24-inch system as by the smaller tubes, the capacity of the system is so great (600 to 800 tons per 24 hours) that all classes of postal matter can be handled with the dispatch, economy, and continuity of first-class matter. As the second, third, and fourth class matter is carried at cheaper rates of postage, this should materially help out in carrying it more profitably. Transporting all this postal matter can be done, and still, such is the carrying capacity of the 24-inch tubes, the power can be shut off during a considerable portion of the 24 hours, when not needed, and the carriers can be run at a slower speed than 30 miles per hour; by so doing the power bill for the year will be materially lowered.

The direction of travel in either tube can be quickly and easily reversed, making the full capacity of both tubes available in one direction when desired. In such a location of postal substations as exists on Manhattan Island and on up into The Bronx this possibility of reversing would permit using one tube of a pair as an express tube, i. e., having stations only at every three or four postal substations. This would permit much greater dispatch in forwarding mail to the distant stations, as well as an economy in not being obliged to forward carriers at each station along the line. The intermediate stations could be connected by the other tube, reversing the use of the tube as desired.

The 24-inch tubes are more economical to operate both for power and repairs, particularly carrier repairs. This statement applies to the transportation of one letter or the maximum capacity of the system. Of course, the more nearly the maximum capacity of the system is approached the lower the cost per ton per mile.

Twenty-four inch tubes as compared with electric carriers in tubes: In using these electric carriers it is necessary to use a 30 or 36 inch tube to contain a

carrier holding the volume of mail that is carried in the carrier of a 24-inch tube. In addition to this, the motor and other necessary apparatus, together with the mail holder itself, takes up so much length that a 50-foot radius is necessary on curves.

We do not say that it is impossible to install 30 or 36 inch pipes, with 50-foot curves, in the streets of our large cities, but we do say that it will be found impracticable to do so in a majority of the streets, on account of the expense involved in moving other subsurface structures to make room for them; neither is it always possible to get the owner of the structures to consent to its removal. The cost of installing the larger pipes will probably be 200 to 300 per cent that of a 24-inch pipe.

In addition to this difficulty is the great risk attached to operating electric apparatus in a necessarily damp, dirty, ungetatable underground tube.

This system must necessarily be equipped with delicate and complicated controlling devices, and it seems hardly possible that any one familiar with the eccentricities of electric devices when exposed to moisture and dirt would be willing to take the risk of depending on such a system for the underground transportation of the mail of a large and busy city. The condensation alone would be of serious danger to the apparatus.

Instead of the unit power plants used in a tube system, located where they can be watched and taken care of momentarily as may be necessary, in the proposed electric system a number of power plants operating at high speed are running in an underground tube, trusting for control to automatic devices.

If anything goes wrong with one of them, the power must be shut off to permit a man to go into it. This means, of course, that the whole system is tied up. Imagine the consequences of a broken water main, which is a frequent occurrence in our cities, or a backed-up sewer, caused by heavy rain or an exceptionally high tide.

Where are the compensating advantages for taking a risk like this with the United States mail?

COMPARING THE 24-INCH TUBES WITH SCREEN WAGONS.

The tube service is more reliable; less interfered with by traffic or weather conditions; more expeditious in transit; continuous in delivery at the destination, permitting an economy in labor for sorting, etc.

A further economy is gained by doing away with much of the labor of loading sacks into and out of wagons.

The postal matter is never out of the hands of postal employees in a Government-operated tube.

The cost of transportation in the 24-inch tube is much less per ton per mile than in a wagon.

DATA ON COST OF WAGON TRANSPORTATION.

The contract rate for wagon delivery in New York City is 38.21 cents per load per mile.

On page 26 of the report of the 1909 commission, an average wagonload is named as about 2,160 pounds.

This would make the cost per ton per mile 35.4 cents. The cost by 8-inch tubes per ton per mile is 1.11 cents; the cost by 24-inch tubes per ton per mile is 6.32 cents.

The data on which these statements are based follows:

DATA ON 8-INCH TUBE OPERATION.

All page references are made to 1909 report.

A cubic foot of first-class mail contains 50 pieces. (See p. 26.)

A cubic foot of first-class mail weighs 36 pounds. (See p. 26.)

Average weight of first-class mail sack is 50 pounds. (J. M. Masten.)

It costs one-half cent to send an 8-inch carrier 1 mile. (See p. 44.)

This carrier contains 0.25 cubic foot, 9 pounds, 450 pieces. (See p. 26.)

Practical maximum capacity of one 8-inch tube is 240 carriers per hour, carrying 2,160 pounds or 108,000 pieces. (See p. 26.)

Therefore 240 (carriers) multiplied by one-half cent equals \$1.20, and represents the cost of transporting 2,160 pounds 1 mile.

Cost per ton-mile, \$1.11.

Analyzing the 1909 committee's estimate of the cost of operating two 8-inch tubes in New York City, omitting the cost of power. (See p. 55.)

Operators, per mile, double tube per year-----	\$3,003.00
Carrier repairs and replacements, per mile, double tube per year-----	2,010.00
Repairs to line and machinery, per mile, double tube per year-----	1,770.00
General expense, per mile, double tube per year-----	1,301.00
Cost of labor, etc., for one year (6,730 hours)-----	8,084.00
Two tubes per hour-----	1.20
One tube per hour-----	.60
<hr/>	
Total cost of operation of one 8-inch tube for one hour as above-----	1.20
Minus cost of labor, etc., as above-----	.60
<hr/>	
Cost of power one hour equal to 20 kilowatts, at 3 cents-----	.60

DATA ON 24-INCH TUBE OPERATION.

Capacity of one 24-inch tube:

Carrier 23 inches muliplied by 40 inches containing 9½ cubic feet.

Loaded to two-thirds capacity contains 6 cubic feet, 216 pounds, 10,800 pieces.

With 20 seconds headway and carriers loaded as above, one 24-inch tube will deliver 1,080 cubic feet, 38,880 pounds, 19.44 tons, 1,944,000 pieces.

*Estimated cost of operating two tubes per mile per year, tube service available
2½ hours daily.*

Operators -----	\$3,000
Carrier repairs -----	150
Repairs to line and machinery -----	500
General supervision-----	500
<hr/>	
Cost of labor, etc.:	
2 tubes, one year (7,962 hours)-----	4,150
2 tubes, one hour (cents)-----	50½
1 tube, one hour (cents)-----	25½

Cost of power for one 24-inch tube one hour, 30 kw. at 3 cents, 90 cents.
(Based on power actually used by 18-inch tube in Washington, D. C., which requires 16 kw.)

Cost of labor, etc., as above, 25½ cents.

Total cost of operating one tube 1 mile, one hour (24 in.), \$1.15.

Total cost of operating one tube 1 mile, one hour (8 in.), \$1.20.

It is evident, therefore, that it costs less to operate the 24-inch carrier through the tube than is required for the 8-inch.

The power consumption in the 18-inch tube varies with the speed of the carrier and increases about one-ninth kw. for each additional carrier used. Very little, if any, increase is shown, as load of carrier is increased, and it is evident therefore that there is no economy in the use of the 8-inch tube as compared with the 24-inch tube, whether used for a very light load or loaded to the practical maximum.

With the 24-inch tube delivering at the rate of 19.44 tons per hour, the cost would be: Labor, etc., \$0.25½; power, \$0.98; cost of transporting the 19.44 tons 1 mile, \$1.23½. Cost per ton per mile, 6.32 cents.

All of the above is based on Government ownership and operation, and interest on investment has, therefore, not been taken into consideration.

J. F. BEDFORD,

Secretary Commission on Mail-Tube Extension.

DEAR SIR: I inclose a letter to Senator Guggenheim, chairman of the committee, together with certain data on cost of operation, etc., of the 24-inch tubes.

I should be glad at any time to give further information or explanation of the figures in the inclosed report if desired.

Very truly, yours,

R. G. CALLIERS, Jr.,
Chief Engineer United States Pneumatic Co.

DECEMBER 19, 1912.

There can be little question as to the fact that carriers operating in large underground tubes provide the best means of transporting mail matter between the large mail-handling centers in cities and their outlying districts.

For this service three types of carriers and two methods of propelling the carriers in the tubes are offered.

The types of carriers offered are:

(1) One in which the carrier is mounted on two wheels (one ahead and one behind) running on a rail fastened to the bottom or floor of the tube, and maintained in an upright position by side wheels which run against side rails in the tube.

(2) One in which the carrier is mounted on four wheels (two behind and two in front) running on rails fastened to the floor of the tube.

(3) One in which the carrier is mounted on six wheels (three ahead and three behind) set radially in the head of the carrier and running directly on the floor or bottom of the tube, which is laid with great care at the joints. This type of carrier is referred to as the "Burton carrier," and is propelled in the tube by exhausting the air ahead of the carrier, usually spoken of as the vacuum system.

Types Nos. 1 and 2 are propelled by electricity supplied by trolley wires or bars fastened to the top or roof of the tube.

Type 1 requires a 30-inch tube to operate a carrier 25 inches in diameter.

Type 2 requires a 36-inch tube to operate a carrier equal to approximately 24 inches in diameter.

Type 3 operates a 23-inch carrier in a 24-inch tube, a 28½-inch carrier in a 30-inch tube, and a 34½-inch carrier in a 36-inch tube. The length of all the carriers is dependent on the radius of the curves.

Any postal matter required to be transported by the parcel-post service can be transported in a carrier of a 24-inch tube.

COMPARATIVE COST OF TUBE CONSTRUCTION.

The cost of 24-inch pipe being 100 per cent:

The cost of 30-inch pipe will be 145 per cent.

The cost of 36-inch pipe will be 180 per cent.

The larger the diameter of the pipe the more expensive to lay in city streets, on account of the expense of moving existing subsurface structures to make room for it. For this reason the cost of installing the pipes of different size in the business sections of cities would probably be:

Considering 24-inch pipe to be 100 per cent:

Cost of laying 30-inch pipe would be 200 per cent.

Cost of laying 36-inch pipe would be 300 per cent.

These figures would probably cover the cost of extra excavation and pavement replacement.

Where electricity is used, the greatest care must be exercised to make the pipe air tight, and also to see that it is kept so. Gas from leaky gas mains is almost always present under the pavement, and it would naturally be drawn into the tube by the movement of the carriers, where it would at once be ignited from a sparking trolley or motor, causing a disastrous explosion.

INTERIOR CONSTRUCTION.

With types 1 and 2 it is necessary to install in the tubes three rails, trolley wires, and other electrical members, which latter must be carefully insulated from the iron tube. The rails must be carefully laid as to alignment, particularly on the many horizontal and vertical curves necessary in turning street corners and passing under and over other subsurface structures.

The original installation of all these members in the tubes will undoubtedly add greatly to the first cost of the electrical system.

INSPECTION AND MAINTENANCE.

All these members in the tubes must be frequently inspected for loose fastenings of rails or wires and broken insulators caused by the vibration of the tube with a 1,000 to 1,500 pound car passing at high speed. The trolley wires must be kept from water.

In one form of proposed electric propulsion the electrical "gap" must be maintained and the members not allowed to touch each other. This may be difficult at vertical curves and at switches.

The wheels on carriers of types 1 and 2 will wear on the curves, and must be frequently and carefully inspected to observe broken wheel flanges in order that no derailment may occur in the tubes. The derailment of a carrier at 30 or more miles per hour would cause damage which might take days to repair. When inspections of the tube are made the electrical current (440 volts) must be shut off.

With a carrier of type 3, there being nothing in the tube, the only parts to be inspected are the wheels of the carriers, and there being six of these, it is probable that at least two on one end would have to break to impede the progress of the carrier.

There being no necessity for inspection, in these tubes, as well as the absence of all rails, wires, fastenings, etc., with their attendant, maintenance, and renewal, the cost of maintenance and repairs should be considerably less in using the type 3 carrier.

For the same reason the danger of interruption in the tube service caused by some member breaking or a car derailing is infinitely less in the case of type 3 carrier.

COST OF CARRIERS.

In a tube system of any length it is, of course, necessary to have a great many carriers. The carriers of type 1 and 2 weigh about 1,000 pounds, and will undoubtedly cost about \$500 each. Twenty-four inch carriers of type 3 weigh 350 pounds, and will cost about \$125 each. Being more simple in construction, their maintenance will probably be very much less than types 1 and 2.

TERMINAL MACHINERY.

Without regard to method of propulsion, positive and dependable stopping devices must be provided. The more simple these are, the more easily will the postal employees master their operation, and the less danger exist of causing damage which may put the tube out of service.

In the methods using electricity as power these appliances are not as yet fully demonstrated, but in the contemplated appliances it would seem that much of the device would be delicate and in need of frequent adjustment.

With the system using the type 3 carrier the means of stopping are fully demonstrated in the existing installation at Washington, and are seen to be positive, automatic in their operation, and as "foolproof" as machinery can well be made.

In handling carriers at stations along the lines, with types 1 and 2 tracks and switches must be furnished on which carriers can stand while being loaded and unloaded. With type 3 the carrier can be quickly and easily rolled out of the main trough into parallel troughs in which they can be unloaded and loaded.

OPERATION.

Much is claimed for the electric system, in having the carriers automatically select and throw the switch at their destination, closing the switch after them and making a proper stop in the necessarily short switch or siding.

If this is possible without too much complication, delicately adjusted devices, etc., it will be of some advantage in sending carriers to distant stations, but this can only be judged properly when actually seen in operation.

It again seems to be of questionable value, when the method of accomplishing the same with the vacuum system is considered. In this the ends of the receiving and transmitting chambers are about 15 feet apart and connected by the half-round trough.

The carrier comes out of the receiving chamber into this trough, with its destination plainly "chalked" on the outside. If it is a through carrier, the attendant gives it a slight push, it enters the transmitting chamber and is off. No delay and no complicated and delicate devices to be dealt with.

SPEED OF CARRIERS.

In considering the speed at which carriers can be propelled through tubes, it must be remembered that the alignment of the tube is necessarily tortuous (on account of passing under and over other pipes, etc., and turning corners), and, therefore, the design of the carrier must be such as will permit the safe passage of these curve points at full speed.

On account of the impracticability of superelevating the rails on these curve points as would be necessary, and as is the practice on railroads, the speed of a carrier running on rails in any tube line must necessarily be limited to the safe speed at these curve points; even at moderate speed a heavy carrier on a rail without superelevation will cause a considerable thrust on the wheel flanges, and if the proper speed is exceeded, this thrust may become a dangerous factor.

With a carrier of type 3, there being no rails or flanged wheels to consider, these curves will have no effect on the speed of the carrier, and it is guided on any curve, either vertical or horizontal, by the radial wheels in contact with the surface of the tube.

POWER REQUIREMENTS.

There being no such system in actual operation, this element of the cost of operation of the electrically propelled carriers can only be considered from the point of theory, at this time, there being several factors which can not be determined until they have been practically demonstrated, such as carrier resistance in a closed tube, and electrical losses of various kinds.

It would appear, however, that comparing the theoretical power requirements of the electrical system with the actual power requirements of the vacuum installation, the latter system is cheaper in cost of power, as well as in cost of installation and maintenance.

TRANSPORTING MAIL MATTER BY MOTOR WAGON AND TROLLEY SERVICE.

The rate of charge for motor-wagon service varies from 22 cents to 30 cents per load-mile.

Where a full wagon load is handled, as from a main post office to a railroad station, the average load is about 1 ton.

Applying the rate charged in New York City (30 cents) for this service, the cost per ton-mile is 30 cents.

As usual, however, the truck starts with a load of perhaps 1 ton, leaves a portion of the load at one station and a portion at the next, etc., with the result that the average load hauled the last mile or two of the trip is not over 200 to 400 pounds. Therefore, the cost of this load may vary from 30 cents per ton-mile on first mile, to \$3 per ton-mile on last mile.

The conditions in the trolley service are very similar, the usual rate for city service being 20 cents per car-mile.

As compared with each the above methods, the tube, handling the mail matter in smaller units shows a great saving in cost, cuts down the time of delivery fully 75 per cent, and gives a more frequent delivery.

REPORT ON THE BURTON VACUUM SYSTEM OF PNEUMATIC TRANSPORTATION.

[As submitted to the commission appointed by the Postmaster General to investigate the proposition for the establishment of pneumatic-tube service between the Grand Central and Pennsylvania Terminals, in New York City, by United States Pneumatic Co., Times Building, New York.]

LARGE DIAMETER TUBES FOR MAIL TRANSPORTATION.

The economical, swift, and safe transportation of mail through tubes of large diameter is now proved to be feasible. Only small diameter tubes are used by the Post Office Department at present, and are all operated by compressed air. For years it was held that large diameter tubes were not practical for this purpose. As indicating this theory, a report upon pneumatic tubes by a commission appointed by the Postmaster General, published in 1909, says:

"The chief mechanical expert of the pneumatic-tube service holds the opinion, after many years of experience and study, that the economical efficiency of tube service is best represented by the 8-inch line, rather than by a tube of greater diameter."

Contrary to the above, it is now demonstrated that, by the use of the Burton method, there is greater efficiency with less energy expended in operating a tube of 18-inch diameter than one of 8-inch diameter.

The Burton system now in successful operation in Washington, D. C., uses tubes of large diameter operated by suction or vacuum instead of by compressed air. It is possible to transport mail in the regulation pouches, or otherwise, and through a perfectly dry tube.

The economy of the system is due to using the assisting instead of the resisting qualities of air. Every open receptacle—so-called empty—is filled with air under a pressure of 14.7 pounds to the square inch, whether it is vertical, horizontal, or inverted. The resisting power of air must be reckoned with. The familiar experiment of pushing an inverted drinking glass into a basin of water shows that the power of air resists even the effort of water “to seek its own level.” In a tube open at the ends the air will resist any energy that propels against it, and the best results are obtained by exhausting the air in advance of the propelled body. An electrically propelled car requires far more power in a tube than when running through the open air.

When compressed air is used to drive a body through a tube, the action is resisted by the natural air pressure. The column of air in the tube, which has to be driven out when compressed air is used, expands against the interior surface of the tube, and is retarded by friction.

When suction is used to exhaust air from the tube in front of a passing body, the natural air pressure rushes in behind the body and propels it forward without the use of other power. Suction draws away the column of air from the surface of the tube to the center, so that its passage is without friction. Therefore, the use of vacuum reduces largely the cost of operation below the cost of using compressed air.

When vacuum exists, only the slightest energy is required to propel anything through it. Complete vacuum is not necessary, but only what is known as an “out-of-balance” vacuum. By decreasing the density of the air in one part of the tube, the normal air pressure becomes active to equalize the balance. This may be illustrated by the action of gravity. An easy running vehicle can be operated by gravity if there is only a slight incline downward. It is not necessary that the track should be perpendicular in line with the center of gravity to feel its power, any more than it is necessary that there should be a complete vacuum to draw the force exerted by natural air pressure.

DESCRIPTION OF THE BURTON SYSTEM.

Charles H. Burton, for many years connected with the installation of the small-diameter tubes, knew the needs of the Post Office Department and all the requirements of satisfactory pneumatic-tube service. He worked to develop a large-diameter system that could be operated at a minimum cost and that would be free from any moisture or liquid mixture in the tube. This he has successfully accomplished.

His invention makes possible rapid locomotion by natural force through tubes of large diameter, and provides means for starting and stopping heavy projectiles passing with great velocity through the tubes. Normal atmospheric pressure is the force that is used as the means of propulsion. A very small suction pressure creates all the “out-of-balance” vacuum that is needed.

The terminals and carriers are built of great strength. Each carrier for the tube in Washington weighs 360 pounds empty, and has inside capacity of 4 cubic feet or from 100 to 150 pounds of contents when filled. It was a problem to arrange for safely receiving these heavy carriers, arriving at great speed at the end of the route, but the problem has been successfully solved. The terminal machinery provides air cushions which check the impact of the arriving carrier, reducing the momentum for safe delivery at the receiving table. The passing of one carrier automatically resets the air cushions for each following carrier. The terminal machinery is so simple that an expert mechanic is not required to attend it. Strangers who have seen the apparatus for the first time have operated it without difficulty. It is only necessary to push an electric switch, which starts the exhaust fan, and move a carrier to the mouth of the apparatus. If no one is at the other end, as has frequently been the case, the apparatus performs its own work and is ready for the following carrier without any attention at the farther end.

No lubrication of the tube is necessary, as the carriers run on wheels with roller bearings and move at the slightest pressure. The tube is always dry, as any moisture is drawn out by suction and no water accumulates in the tube, a condition that is unavoidable where compressed air is used instead of vacuum.

The Burton system is equally applicable to tubes of different diameters, either 18 inches, 24 inches, 36 inches, or larger. The tubes are the standardized pipe of the American Water Works Association, and under this system do not have to be bored. They are laid just as they are sent from the foundry after inspection. No tracks, grooves, or trolleys have to be provided in the tube. On this account, installation is much simpler and cheaper and the cost of maintenance is reduced. The expense of repairs inside of the tubes is not only saved, but the more serious consequence of delay on account of such repairs is avoided.

It is possible by a relay system to extend the service for any number of miles. The speed, as stated in the engineers' report, is without limit "up to the safety of the machine." As a matter of test, the carrier has been sent through the tube at the United States Capitol at the rate of 90 miles per hour. For practical purposes the average speed recommended is 30 miles per hour.

It is perfectly feasible to install the Burton 24-inch tube between the Grand Central and the Pennsylvania terminals in New York City.

It is proposed to install double-tube service, so that either tube could be used in both directions and the terminal machinery changed from a receiving to a dispatching function by the adjustment of a single lever. Both tubes could be used one way if the service was heavy in that direction, or constant service would still be possible in both directions in case, for any reason, one tube should be out of commission. It is estimated that this double-tube line would convey 36 tons of mail per hour in one direction, or 18 tons each way per hour. The time between the two stations should not be more than two and one-half minutes. If the mail is handled in pouches as units, the attendant who would ordinarily deposit the unit in a wagon for transportation would deposit it in a waiting carrier, which would be dispatched through the tube without using skilled labor.

In conference with D. H. Burnham & Co. (architects) and the plans committee of the new Washington post office a plan for the sliding accommodation of surplus carriers was prepared and blue prints of the same are attached hereto. Under this plan semicircular open troughs, curved the same as the tubes, extend from the mouth of the terminals and accommodate 80 empty carriers ready for immediate dispatch. At one central point the open troughs run under a large flat table or platform, from which the pouches or mail sacks are put into or taken out of the carriers. From this table a conveyor takes the incoming mail to upper floors, and a chute brings to this table the outgoing mail. The carriers move at the slightest pressure of the hand and are guided to and from the platform with ease. This plan could be changed to suit other locations and conditions.

THE INSTALLATION IN WASHINGTON, D. C.

The United States Pneumatic Co., knowing the demand in the Post Office Department for an apparatus of this sort, desired to have a full working system in operation for the purpose of convincing the officials of that department of its efficacy and value. The commission in control of the House Office Building authorized the installation now in operation between the Capitol and House Office Building. After the completion a commission of engineers was specially appointed to investigate, test, and report if the apparatus was satisfactory, and if it met the guaranty that was made in regard to it. This report was most favorable, and a copy of same is hereto attached.

The apparatus was formally approved and adopted by the United States Government, and an estimate for its extension to all of the legislative buildings in the Capitol group was asked for and referred to the Senate Committee on Public Buildings and Grounds. This committee held a hearing on the subject shortly before the close of the last session of Congress, and the following members personally investigated and approved the operation of the Burton system: Senators Sutherland (chairman), Wetmore, Heyburn, Martine, and Watson. Ten days later Senator Heyburn, of the above committee, presented the following amendment to the sundry civil bill, which was unanimously passed by the Senate:

"Pneumatic-tube service: For a pneumatic-tube system to connect the Capitol, the Senate and House Office Buildings, the Congressional Library, the

Union Railroad Station, the new post-office building, and the Government Printing Office of a capacity sufficient to handle the documents, parcels, and mail sacks dispatched between these buildings, to be expended by the Superintendent of the Capitol Building and Grounds, under the joint supervision and joint direction of the Postmaster General and the Superintendent of the Capitol Building and Grounds, \$250,000, or so much thereof as may be necessary."

Many officials of the Post Office Department have seen its operation and approved of it, and many engineers connected with the Government and other experts have all approved of this system.

The apparatus has been operated more than 2,000 times since its installation and tested under every condition, including temperature once at 14 degrees below zero and at another time 102 degrees above.

The interior frame of a carrier for the 24-inch tube of the Burton system has been tested at the Washington post office as to its capacity. It was found that every form of full mail sack or pouch used by the department could be contained in this carrier.

The essentials for a satisfactory mail-tube service are as follows:

1. *Tubes*.—That will always be dry; that will be of sufficient diameter for transporting the largest sized mail sack or pouches filled to their capacity; that will be free from any interior mechanism, trolleys, or attachments that might need repairing.

2. *Carriers*.—That are build of hardened steel of the greatest possible strength; that will run with the slightest exertion; that will have all removable parts doubly fastened and locked in place; that can be quickly loaded and emptied.

3. *Terminals*.—That are strong, simple, and automatic, so that even if not attended when in operation no damage can happen.

The Burton vacuum system of pneumatic transportation covers all of these essentials, and it is hereby recommended, and this report is respectfully submitted by the United States Pneumatic Co.

REPORT OF COMMISSION OF ENGINEERS APPOINTED BY UNITED STATES GOVERNMENT ON THE EFFICIENCY OF THE BURTON SYSTEM AND THE GUARANTY MADE BY THE POSTAL SERVICE EXTENSION CO.

OFFICE OF SUPERINTENDENT,
UNITED STATES CAPITOL BUILDING AND GROUNDS,
CHIEF ELECTRICAL ENGINEER,
Washington, D. C., September 1, 1911.

HON. ELLIOTT WOODS,
Superintendent United States Capitol Building and Grounds,
Washington, D. C.

SIR: In accordance with your letter we, the undersigned, witnessed the demonstration of the Burton vacuum system for the transmission of mail, documents, or other matter between the two terminals, one in the basement United States Capitol and one in the basement House Office Building.

There is no doubt of their ability to handle these carriers through the 18-inch tube between the two terminals mentioned. The electric equipment and blowers are in excess of what is necessary to handle the carriers. There seems to be no limit to the speed up to the safety of the machine at which the carrier can be handled. From the demonstration we feel satisfied that it will meet the guaranty made by them.

Respectfully,

C. P. GLIEM,
Chief Electrical Engineer.
H. W. TAYLOR,
Chief Engineer House of Representatives.
A. E. COOK,
Machinist.

Thereupon, at 4 o'clock p. m., the commission adjourned to meet at the call of the chairman.

WASHINGTON, D. C.,
Tuesday, December 17, 1912.

The commission met at 10.30 o'clock a. m.

Present: Senator Simon Guggenheim (chairman) and Representative Blackmon; also, Mr. John M. Masten.

**STATEMENT OF MR. FRANK E. ANDERSON, OF NEW YORK,
REPRESENTING THE UNITED STATES PNEUMATIC CO.**

Mr. ANDERSON. I do not want to take up the time of the commission to make any remarks at all, but simply to say that you have seen our apparatus, and we think seeing is better than hearing, perhaps, especially when time is so short. But we have an expert engineer with us, and we would like to give you some figures as to the cost of operation compared with other systems which the Government has used. That is all I have to say.

The CHAIRMAN. We are very glad to have information of that kind. I do not think it will be necessary to have the figures given to us now, orally, but they can be given to the stenographer, unless the engineer wishes to be heard.

Mr. ANDERSON. I would be glad if you would hear what he has to say, and then the figures will be left with the commission.

The CHAIRMAN. Very well.

Mr. BLACKMON. Mr. Chairman, in this connection I would like to have a list of the stockholders of the American Pneumatic Tube-Service Co., and a full statement. Mr. Hayden said he would be glad to give us any information he had, and I want to know the amount of stock held by each one of them, and the dividends they have paid during their organization.

Mr. CLARENCE W. DE KNIGHT. I will make a memorandum of that. I am simply here as a spectator, but I will communicate that to Mr. Hayden.

The CHAIRMAN. If it is not forthcoming, the secretary will take it up with him, but we prefer to have you send it to us.

Mr. CLARENCE W. DE KNIGHT. I will see that it is sent to you. That is, a list of the stockholders, the amount of stock held by each, and the dividends that have been paid?

Mr. BLACKMON. Yes.

**STATEMENT OF MR. ELLIOTT WOODS, SUPERINTENDENT OF THE
UNITED STATES CAPITOL.**

Mr. WOODS. I think I ought to make the statement that, so far as the mail facilities and the operation of the pneumatic tube for mail service are concerned, I do not think I can be of any assistance to you at all, because I know nothing at all about them. I assume that information can be obtained from your post-office authorities. I am willing to answer any questions relating to the Capitol and the other buildings here.

The CHAIRMAN. We want the benefit of such information as you can give the commission, what you think of the pneumatic tube over on the House side, and whether you think it would be beneficial for the Government to adopt such a system.

Mr. Woods. I think it would be very beneficial for the Government to have a pneumatic-tube service, operated by its own officials and owned by the Government. As I understand the pneumatic-tube service now, most of it is under contract.

The CHAIRMAN. That is right.

Mr. Woods. Personally, I should prefer the operation of a mail service owned by the Government. So far as this tube installed at the Capitol as an exhibition is concerned, that was installed under orders of the House commission as an exhibition plant; but to prevent a claim coming back on the Government that company was compelled to sell that tube at a nominal cost to the Government. I think it was \$1,000 that the Government paid for it.

It has never been put into practical operation, for the reason that we have no authority to hire employees to operate it. It was turned over to the House folding room to experiment with in the transportation of documents between the House document room and the House Office Building. For that reason, I think it would be a good thing to have an exhibition of that system, or a similar system, made between the Printing Office and the buildings on the hill, both for mail service and the transportation of documents. If the post-office authorities are satisfied with the present size of tube for the transportation of the mail, I would recommend that a large tube of some character be installed for the transportation of documents.

The CHAIRMAN. Would it be any larger than the present tube installed over there?

Mr. Woods. Since that tube was installed half a dozen schemes have been proposed for larger tubes. One coming in lately provides for a 30-inch tube, with an electric carrier, and I think, for documentary service, a large tube is the thing. I believe that perhaps it would operate more economically if the car were driven by electricity than by any pneumatic service. In running these systems between the buildings I should think it ought to carry a large tube for documents and a smaller tube for mail.

The CHAIRMAN. How small a tube would answer the purpose for mails?

Mr. Woods. I know nothing about that, Senator, except what the Post Office Department has stated about it. What is the largest tube they have?

Mr. MASTEN. Eight-inch is the standard adopted, after a thorough investigation.

Mr. Woods. The thing that has appealed to us, or rather to the members of the commission, was the fact that up to this time they had been told—and I had been told—that an 8-inch tube was about the standard-size tube. That would seem to be too small for the transportation of ordinary documents such as we have to transport between the Printing Office and the Capitol. The fact that this tube was an 18-inch tube appealed to us, because it was claimed that it could transport the equivalent of a bag of books, and I think that has been shown.

I have a little memorandum here which I will furnish the committee, if you have not the information already at hand, as to the cost of operation of that tube, such as our engineers figure it.

The CHAIRMAN. That is very important. They are your figures?

Mr. Woods. They are made by our engineers.

The CHAIRMAN. Have you noticed any defects in the system over there?

Mr. WOODS. I do not know of any myself. The trouble is it has not been operated long enough to test its real value.

The CHAIRMAN. What is the cause of the failure to test it?

Mr. WOODS. It is really the failure of the House side to provide employees.

The CHAIRMAN. In other words, there has been no money on hand?

Mr. WOODS. It has not been taken up seriously by the House folks at all.

It would be easy, I think, for two or three of the House folding-room employees to be educated in the operation of it. It is very simple as I see it; although it might not seem simple to a man who has no mechanical turn of mind.

Mr. BLACKMON. Mr. Woods, have you made any investigation, or have you made any calculation, with reference to the cost of the present system of transporting these documents, as compared with the cost of operating the pneumatic tube?

Mr. WOODS. I have not. The Public Printer, I think, has made a statement, which I think will be found in the hearing before the Committee on Public Buildings and Grounds of the Senate, of June 7, 1912. You will find in that hearing a great deal of interesting information.

Mr. BLACKMON. Mr. Chairman, would it be a bad idea to print in the record that part of the report that deals particularly with the question of cost?

The CHAIRMAN. I think it would be very advantageous.

Mr. BLACKMON. So that we could have it all in.

The CHAIRMAN. There is no objection to this information about the cost going into the record, Mr. Woods?

Mr. WOODS. Not at all. In fact, in that hearing you will find a letter I wrote to the chairman of that committee advising in favor of pneumatic transportation between the buildings. It is more a question of operation between the Printing Office and the buildings on the hill, because we have a great many documents, and I think you will find the Public Printer has made a statement in reference to that.

Mr. BLACKMON. That is what I would like to have go in the record also, Mr. Chairman.

The CHAIRMAN. Very well.

Mr. WOODS. In this memorandum I have, assuming continuous operation over there, with the carriers traveling about as fast as they could succeed one another, it figures out—that is, without the services of the employees, but just the cost of operation—at the rate of about 5 cents a ton for books. If I had known that, I could probably take the figures of the Public Printer and find out just what that sort of a system would cost. I think you will find, if you go in for pneumatic and other transportations, that a great development in all these matters will be made with outside pneumatic service for mails; you will find that inventors will bring forth very good ideas for book transportation. The Public Printer, I think, is heartily in favor of some method of that character, either pneumatic or otherwise, for

the transportation of documents, and I believe you will find in his communication some interesting figures.

I assume I may speak about another matter, because it relates to the transportation or the handling of the mails. The House of Representatives established their post office in the main vestibule of the rotunda in the House Office Building. We provided for similar space here in this building. The House operates its main post office at the House Building with a substation at the Capitol. For instance, it would be very desirable to have a pneumatic service between that post office and the Capitol, but for that purpose I would not recommend that apparatus; it is too clumsy; it is not quick enough, and a small tube would be serviceable for that particular purpose. You could carry along with the construction of larger tubes for book transportation, or smaller tubes for mail transportation, an operating system of that character economically.

The CHAIRMAN. Is it not true, Mr. Masten, that the 8-inch tubes are practically owned by one company?

Mr. MASTEN. All but those in Philadelphia are controlled by the American Pneumatic Service Co.; in Philadelphia they are controlled by the Pneumatic Transit Co. of New Jersey.

Mr. WOODS. I would suggest that the chairman of the House Office Building Commission be requested to confer with Mr. Fitzgerald with a view of having two employees of the folding room detailed to experiment with the pneumatic service now installed in the House.

The CHAIRMAN. How is the mail being handled now for the use of the Senate and the House?

Mr. WOODS. By wagons. If my memory serves me right, it goes to the general post office first, and is there handled in the substation, and delivered to the Capitol by wagons, and distributed in wagons.

The CHAIRMAN. Then how is it handled from the House Office Building and the Senate Office Building to the Capitol?

Mr. WOODS. By messengers.

The CHAIRMAN. Entirely by messengers?

Mr. WOODS. Yes, sir.

The CHAIRMAN. Do you not believe considerable time could be saved by some pneumatic device?

Mr. WOODS. Certainly.

The CHAIRMAN. Is it not true that at the last end of a session of Congress, when there are hundreds of bills ready for signature, they have to be engrossed in the Printing Office—they are printed on parchment—and every one of those bills has to go backward and forward from the Government Printing Office to the Capitol by messenger?

Mr. WOODS. That is not all of it. Every important committee has more or less work to do on bills during a session. The first part of the transaction is that the bill is made up. That has to go backward and forward. Then the committee acts on the bill, and makes changes in it, and that goes backward and forward to the Printing Office. And so it continues, until the bill finally comes out in the Senate or the House. That transportation is by messenger service with all of the important committees of the Senate and the House.

The CHAIRMAN. Unless you have something else, Mr. Woods, we are very much obliged to you.

Mr. WOODS. I have nothing else, I believe.

The CHAIRMAN. Mr. Masten, has an auditor or an engineer ever been employed in the past to make an independent investigation for the benefit of former commissions?

Mr. MASTEN. The only congressional commission that I recollect was the Wolcott and Loud Commission, who employed only a secretary and the necessary stenographers; I think no engineer or auditor was employed by them. The congressional investigation authorized in 1908 was through the Postmaster General, he being allowed an appropriation of \$10,000 to conduct the necessary investigations into the cost of construction, operation, maintenance, etc.; and the Postmaster General proceeded through the appointment of a committee of seven individuals from private life, representing commercial, engineering and technical information. That report was submitted to Congress through the Postmaster General.

The CHAIRMAN. And you say there were some engineers on that commission appointed by the Postmaster General?

Mr. MASTEN. Yes, sir. Mr. Alfred Manning, of Baltimore, was an engineer who had constructed the Baltimore & Ohio tunnel; Mr. Lyman Cooley was a mechanical and civil engineer of Chicago of much experience; Mr. Frye was an engineering expert from the Navy and Treasury Departments combined, whose headquarters was in New York.

Thereupon, after informal discussion, the commission adjourned to meet to-morrow, Wednesday, December 18, 1912, at 11 o'clock a. m., in executive session.

APPENDIX.

REPORT OF THE PUBLIC PRINTER.

OFFICE OF THE PUBLIC PRINTER,
Washington, May 17, 1912.

MY DEAR SENATOR: Referring to the communication from Mr. Horace H. Smith, assistant clerk Committee on Public Buildings and Grounds, United States Senate, dated April 30, 1912, including copy of an amendment providing for a pneumatic-tube system between the Capitol, Government Printing Office, and other Government buildings, and requesting that the same be considered and a report made thereon, I have the honor to submit the following information:

The total cost of delivery by messenger service and horse-drawn vehicles from November 14, 1910, to November 13, 1911, was \$57,645.47. On November 14, 1911, electric vehicles were substituted for most of the horse-drawn vehicles, which will result in an estimated yearly saving of \$15,000.

Using this estimate as a basis, the yearly delivery from the Government Printing Office will cost \$43,000, as follows:

To Capitol, House, and Senate Office Buildings-----	\$7, 300
To Congressional Library-----	1, 300
To departments and bureaus-----	26, 000
To railroad yards (postal cards)-----	6, 500
To Post Office -----	1, 900
Total -----	\$43, 000

Eliminating postal-card shipments, which are direct to the railroad yards, I am of the opinion that 80 per cent of our deliveries are of such a nature as to permit their forwarding by means of a pneumatic or electric system at a considerable saving in the cost of maintenance and operation, and that the handling of work would be greatly expedited.

With the hope that the information contained herein will be of use to your committee, I am,

Yours, very truly,

SAMUEL B. DONNELLY,
Public Printer.

Hon. GEORGE SUTHERLAND,
*Chairman Committee on Public Buildings and Grounds,
United States Senate, Washington, D. C.*

The following memorandum was submitted by Mr. Woods:

EIGHTEEN-INCH PNEUMATIC TUBE LINE BETWEEN THE CAPITOL AND THE HOUSE
OF REPRESENTATIVES OFFICE BUILDING.

COST OF HAULING CARRIERS—LOADED OR UNLOADED.

Power cost per hour, 150 amperes, 110 volts, 16,500 watts or 16.5 kilowatts, at 2 cents per kilowatt hour, 33 cents per hour.

Capacity of line, 150 pounds per carrier, 4 carriers per minute or 24 carriers per hour, will haul 36,000 pounds, or 18 tons.

One hundred pounds per carrier, sending 2 carriers per minute, will handle 200 pounds per minute, or 12,000 pounds, making 6 tons that can be hauled per hour.

Carriers will hold easily a No. 2 tie sack of the post-office regulation size.

Tests have been made with various documents and papers, from the folding room.

One carrier will hold 16 bound volumes of the Congressional Record, weighing 104 pounds; 42 copies, in No. 2 tie sack, and weighing 131 pounds. Carrier has also been filled with loose papers of all kinds and sizes, a total weight of 113 pounds.

WASHINGTON, D. C., *January 10, 1912.*

WASHINGTON, D. C., *Wednesday, January 8, 1913.*

The commission met at 2.30 o'clock p. m.

Present: Senator Simon Guggenheim (chairman), Representative Victor Murdock and Hon. Joseph Stewart, Second Assistant Postmaster General.

STATEMENT OF J. E. MILHOLLAND, ESQ., OF LEWIS, N. Y., A
STOCKHOLDER IN THE PNEUMATIC TRANSIT CO. OF PHILA-
DELPHIA.

Mr. MILHOLLAND. Mr. Chairman and gentlemen, I appear here to-day because the president of the Philadelphia Co., Mr. James B. Mabon, is unable to be present. I wish to express his regret that he could not come.

The CHAIRMAN. Will you kindly give us all the information on the subject you can?

Mr. MILHOLLAND. My remarks will be brief. In this I hope they will be typical of the whole Philadelphia presentation. We are more or less familiar with what has been presented here in behalf of the other companies, and we have no desire to traverse the same routes that they have traversed. It is the intent of our people to discuss only those things that have not been touched upon or have not been sufficiently elaborated.

In a general way, the positions taken by our friends the Boston people are reaffirmed by the Philadelphia Co.; a willingness to sell on proper valuation and also an advancement of the idea that they

threw out in regard to a readjustment of the contracts instead of a direct, immediate cash sale. That suggestion appeals with particular force to Philadelphia. It is the one point upon which I would dwell for a moment. The idea put forth, you will remember, was the substitution of 50-year contracts for the short-term arrangement now in operation. Fifty years is quite a long time, but in offering it the companies express faith in the permanence of the systems. We think it would be entirely safe to take a very much shorter period. We believe that we can work out a plan for half that period; say 25 or 30 years, and, by an amortization process, achieve results enabling the Government to obtain the plants in good order at the termination of the contracts. The 50 years' expression is valuable, as I remarked, in showing the confidence of the owners of the systems in their endurance—their longevity. We are perfectly confident that at the end of half a century the systems will be in good condition. The details of the amortization, wherein may be involved a slight increase of rentals, will be brought out later in tabulated statements prepared or interpreted by the gentlemen who will follow me—Mr. Murray, the treasurer of the Philadelphia company, Mr. Stuart, who has been the chief engineer and has had considerable experience abroad, and Mr. Stevenson, one of the attorneys for the company.

The companies are prepared to go right on as they are at the present time and build whatever the Government desires to have built; but they want to be relieved of this tremendous difficulty that confronts them in connection with the business, namely, the practical impossibility of marketing securities on these short-term contracts. That has been already thrashed out here, so that I need not go into it further. The idea of having the business brought into such shape that there would be no hiatus whatever in this development is paramount in our minds. If the Government in its wisdom should think it well to make immediate purchase, we are quite prepared to meet the Government on every possible point; on a system of amortization, on a valuation, and some of the other suggestions made here, such as that which includes capitalization of the earnings on a 6 per cent basis; and, also, there was another suggestion coming originally, I believe, from the Interstate Commerce Commission, in valuing railway property; about the value of the going concern, the original cost and the cost of reproduction, divided by three. We are quite willing to give careful consideration to any of those methods of acquisition, but of them all amortization seems most in keeping with sound, modern methods, and is gaining further favor at home and abroad.

So much by way of introduction; if something comes up in the course of the discussion to follow I would be glad to avail myself, on behalf of Mr. Mahon, of an opportunity to make a further statement.

Mr. STEWART. I presume you have figures on these various plans suggested?

Mr. MILHOLLAND. Yes; they will be submitted by the other gentlemen. Mr. Murray will now take up the matter in behalf of the company.

STATEMENT OF MR. W. P. J. MURRAY, OF PHILADELPHIA, TREASURER OF THE PNEUMATIC TRANSIT CO. AND THE INTERNATIONAL PNEUMATIC TUBE CO.

Mr. MURRAY. Mr. Chairman and members of the commission, I have here a map of the system in Philadelphia, which I would like to leave with the commission. (Exhibit F.)

The pneumatic transit system in Philadelphia consists of approximately 10 miles of double 8-inch pneumatic tubes. It connects the central post office with the Bourse Station. This is the earliest line that was constructed in the world in what is known as large pneumatic tubes. It is 6 inches in internal diameter and some 0.56 mile in length. It was constructed in 1892 and placed in operation early in February, 1893, during the administration of Postmaster General Wanamaker.

The next construction in the city of Philadelphia was at Broad Street Station, in the year 1897. I do not wish to unnecessarily take up the time of the commission, but in order to state the development of our system I wish to relate the construction of the lines in detail and the time they were constructed and what they were. In 1898 the central post office to Broad Street Station line was constructed. In 1905, the lines known as "central post office to Stations S and O" were constructed. In 1908 the line from Southwark Station to Station D was constructed, and, in 1910, the last line to North Philadelphia and Fairhill Station were constructed, although in the year 1909 the Reading Line was rebuilt from the central post office to the Reading terminal station.

The Pneumatic Transit Co. is capitalized in the original capitalization as \$500,000 of common stock, which is still outstanding. Subsequently, in 1897, there was a bond issue of some \$200,000, all of which figures, of course, we will present in the balance sheet, and the subsequent construction from 1905 was all financed by the preferred stock, which is outstanding to the extent of \$996,900, making a total capitalization of \$1,696,900. The tangible property in assets represented by this capitalization consists of our plant and our earnings statement, as compiled by Messrs. Lybrand, Ross Bros. and Montgomery, which will be presented to the commission for the year ending March 31, 1912, shows approximately an earning of \$85,000 per year for our plant.

The Pneumatic Transit Co. constructed its lines under various ordinances, the most recent of which was granted in 1907 by the city of Philadelphia, and a copy of that will be submitted to the commission.

The ordinance above referred to reads as follows:

An ordinance authorizing the Pneumatic Transit Company to lay tubes with branches, switches, and electrical conductors in certain streets in the city of Philadelphia.

SECTION 1. *The Select and Common Councils of the city of Philadelphia do ordain*, That the Pneumatic Transit Company is hereby authorized to lay and maintain and operate pneumatic tubes or pipes, and to lay with the said tubes or pipes conduits and electric conductors and to construct manholes, switches, and drips that may be required to operate the said tubes in such streets and alleys as shall be selected by the board of highway supervisors to connect the general post office, railway stations, and branch post offices within the limits of the city of Philadelphia, for purposes of transmitting the United States mails, with the right to connect the power house of the said company with the

The present design of lid represents seventeen years of development and study. It is impossible for lid to open in the tube while in transit. All locking mechanism is inside of carrier.

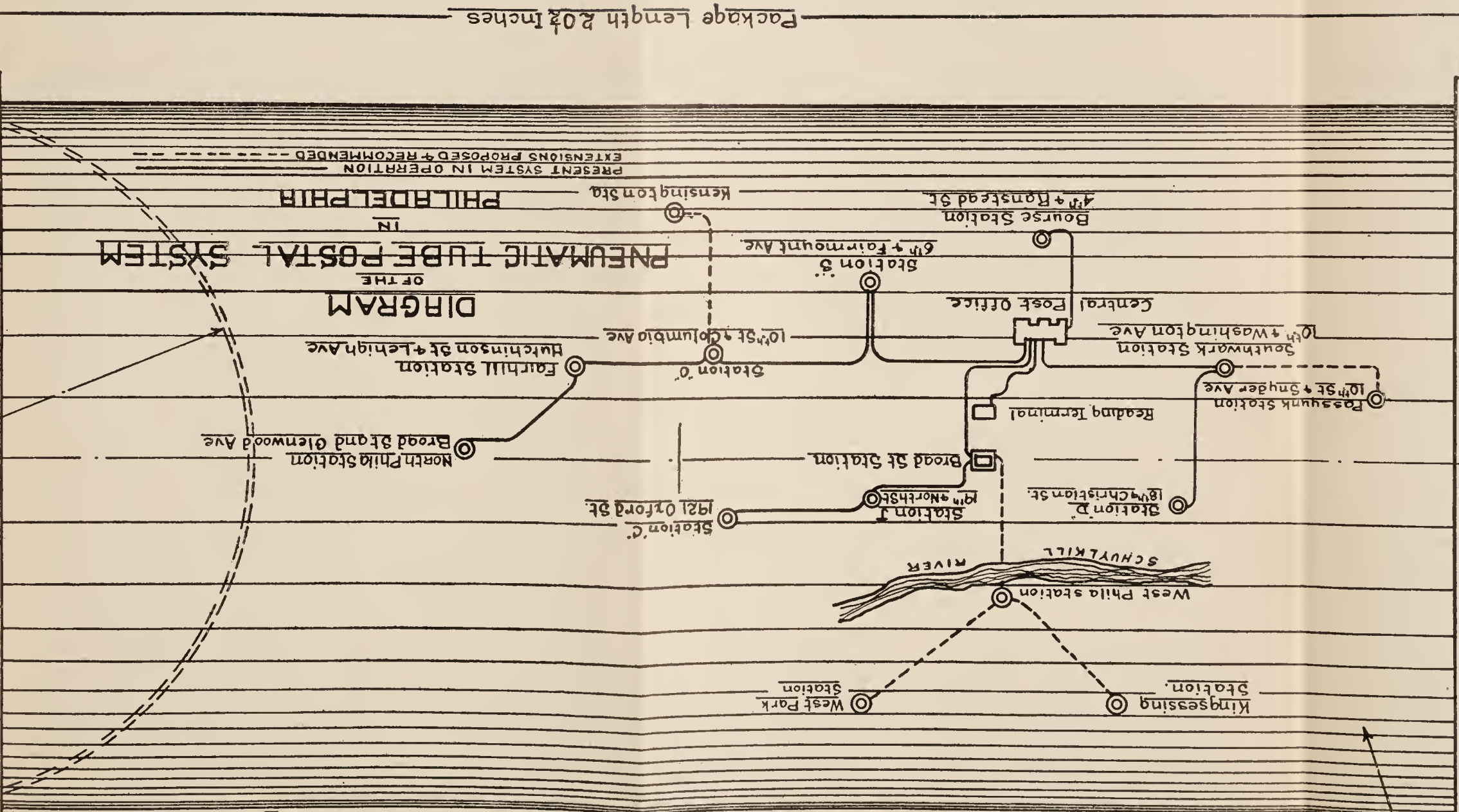
Carrier shell made of highest grade saw steel 1/2 inch thick. These shells give five (5) years of most exacting and rigorous service.

COMPONENTS of PNEUMATIC TRANSIT COMPANY
305-06-07 MARINER & MERCHANT BUILDING - PHILADELPHIA, PA.
OPERATING COMPANY FOR
THE INTERNATIONAL PNEUMATIC TUBE COMPANY

Bearings, rings of alternate layers of best quality cotton duck and rubber, compressed to bone hardness. Life of ring 15000 miles

Buffer made up of leather cup filled with cork hydraulically compressed to shape and reinforced with pressed steel head. Buffer is designed to absorb impact when carrier is brought to rest from a speed of 50 feet per second.

The Pneumatic tubes range in diameter from 2 to 12 inches. The Post Office Department uses the 8 inch tube more than any other.	
U.S. GOVERNMENT APPROPRIATIONS FOR THE SERVICE	
1893	Free trial service
1895	\$ 3,400.00
1897	150,000.00
1899	225,000.00
1901	500,000.00
1903	800,000.00
1906	1,233,676.84
1908	1,388,759.00
MILEAGE IN OPERATION IN FOLLOWING CITIES	
NEW YORK	25 MILES
PHILADELPHIA	10 "
BOSTON	8 "
BROOKLYN	4 "
CHICAGO	12 "
ST LOUIS	4 "
CAPACITY OF CARRIER-600 Letters	
DISPATCH OF CARRIERS-10 per Minute	
SPEED OF CARRIERS-50ft per Second	
WEIGHT OF CARRIER-19 Pounds	
WEIGHT OF CARRIER-Loaded-40 Pounds	



Package Length 2.02 Inches

EIGHT INCH CARRIER
PNEUMATIC TRANSIT COMPANY
ENGINEERING DEPARTMENT
1038 RIDGE AVENUE
PHILA PA.
12-1-10

12.50

said lines of tubes and conduits if located within two squares of said lines: *Provided*, That nothing herein contained shall be construed as granting a right to use the highways for any other business than that of transmitting the United States mails through pneumatic tubes. The said tubes, branches, connections, switches, conduits, manholes, and other parts shall be laid and constructed in such manner as shall be satisfactory to the department of public works and in accordance with plans to be approved by said department, and the company shall, in each case where the streets are torn up, restore the streets to the same condition in which they were found. The work of laying said tubes and conduits herein authorized shall be begun within 12 months after the approval of this ordinance, and be completed within five years from the said approval, after which time the right to occupy the streets not already actually occupied shall cease and determine. The granting of this right to the company shall, however, not be construed as giving them the exclusive use of any street for the purpose of laying conduits therein.

SEC. 2. Wherever the said company shall break a street or alley they shall repair the same under the specifications of the department of public works, repaving over the trench and one foot on each side, keeping it in repair for three years: *Provided*, Where it is necessary to break a street paved with improved pavement occupied by a street passenger railway company, they shall pay into the city treasury the price paid by the city to its contractor for repairing such pavement for each square yard of pavement broken and 5 per cent in addition thereto for inspection, and shall be at no further cost or expense on account thereof. Whenever the said company shall break a sidewalk of a street they shall repair the same in an approved manner, and keep it in repair for three years.

SEC. 3. Before any work shall be done under this ordinance the said company shall file with the mayor its bond in the sums of \$25,000 in form to be approved by the city solicitor, conditioned that it will indemnify the city and owners of property against any and all damages caused by construction or operation of its work, and for the faithful performance of all the provisions and agreements of this ordinance, and shall also pay into the city treasury the sum of \$50 for printing this ordinance.

July 1, 1907.

We have also here a list of the patents under which the company operates. I think they are 71 in number.

The list of patents referred to is as follows:

The Pneumatic Transit Co. has the exclusive license for using, selling, or operating in the city of Philadelphia or within a radius of 20 miles of the city of Camden, N. J., all of the patents in the following list:

Patent No.	Date issued.	Inventor's name.	Description.
567067	Sept. 1, 1896	B. C. Batcheller.....	Carriers for pneumatic transmitting apparatus.
568291	Sept. 22, 1896	.....do.....	Valve mechanism for pneumatic transmitting pipes.
585498	June 29, 1897	.....do.....	Pneumatic dispatch apparatus.
585647	July 6, 1897	.....do.....	Electropneumatic circuit closer.
590181	Sept. 14, 1897	.....do.....	Carriers for pneumatic dispatch apparatus.
595754	Dec. 21, 1897	.....do.....	Substation sending apparatus for pneumatic dispatch tube system.
595755	.....do.....	.....do.....	Pneumatic dispatch tube system.
595756	.....do.....	.....do.....	Sending apparatus for pneumatic dispatch system.
602422	Apr. 19, 1898	.....do.....	Apparatus for locating obstructions in tubes.
623968	May 2, 1899	.....do.....	Pneumatic transmitting system.
623969	.....do.....	.....do.....	Do.
623970	.....do.....	.....do.....	Pneumatic dispatch apparatus.
623971	.....do.....	.....do.....	Do.
623972	.....do.....	.....do.....	Carriers for pneumatic dispatch apparatus.
623973	.....do.....	.....do.....	Carrier-receiving mechanism for pneumatic transmitting tubes.
657078	Sept. 4, 1900	.....do.....	Packing devices annular joints.
657079	.....do.....	.....do.....	Carriers for pneumatic transmitting tubes.
666175	Jan. 15, 1901	.....do.....	Pipe couplings.
700607	May 20, 1902	.....do.....	Sending apparatus for pneumatic dispatch system.
706291	Aug. 5, 1902	.....do.....	System and apparatus for transmitting carriers in pneumatic dispatch tubes.
707071	Aug. 19, 1902	.....do.....	Pneumatic time locks for pneumatic tube systems.
721476	Feb. 24, 1903	.....do.....	Apparatus for ascertaining condition of pipe conduits.
722667	Mar. 17, 1903	.....do.....	Pneumatic transmitting system.

Patent No.	Date issued.	Inventor's name.	Description.
746266	Dec. 8, 1903	.....do.....	Sending devices for pneumatic tubes.
746267	.....do.....	.....do.....	Pneumatic dispatch apparatus.
749152	Jan. 12, 1904	.....do.....	Pneumatic dispatch system.
627181	June 20, 1899	Fordyce.....	Pneumatic carrier.
635454	Oct. 24, 1899	.....do.....	Terminal for pneumatic tubes.
654690	July 31, 1900	Townsend.....	Pneumatic dispatch tubes.
666747	Jan. 29, 1901	Fordyce.....	Carrier for pneumatic dispatch tubes.
683022	Sept. 24, 1901	Cowley.....	Pneumatic dispatch tube apparatus.
683140	.....do.....	Pike.....	Terminal for pneumatic dispatch apparatus.
683141	.....do.....	.....do.....	Do.
683387	.....do.....	Cowley.....	Pneumatic dispatch tube apparatus.
684715	Oct. 15, 1901	Pike.....	Complete pneumatic dispatch tube terminals.
685674	Oct. 29, 1901	Cowley.....	Transmitter for use in pneumatic dispatch tube apparatus.
689043	Dec. 17, 1901	Fordyce.....	Pneumatic dispatch tube system.
698830	Apr. 29, 1902	.....do.....	Pneumatic dispatch tube.
703120	June 24, 1902	Danley.....	Pneumatic carrier system.
706639	Aug. 12, 1902	Cowley.....	Pneumatic dispatch apparatus.
722562	Mar. 10, 1903	Burton.....	Carrier for pneumatic dispatch tube apparatus.
726022	Apr. 21, 1903	.....do.....	Pneumatic carrier.
726017	.....do.....	Blanchard.....	Lock for pneumatic dispatch tube carriers.
626097	.....do.....	Pike.....	Pneumatic carrier.
742513	Oct. 27, 1903	Stoddard.....	Pneumatic dispatch apparatus.
742514	.....do.....	.....do.....	Do.
742515	.....do.....	.....do.....	Do.
742516	.....do.....	.....do.....	Do.
742517	.....do.....	.....do.....	Do.
742390	.....do.....	Burton.....	Pneumatic carrier.
758568	May 24, 1904	Stoddard.....	Pneumatic dispatch apparatus.
760658	.....do.....	.....do.....	Circuit breaker.
760569	.....do.....	.....do.....	Pneumatic dispatch apparatus.
768030	Mar. 23, 1904	Burton.....	Pneumatic carrier.
768031	Aug. 23, 1904	.....do.....	Pneumatic dispatch apparatus.
772973	Oct. 25, 1904	Stoddard.....	Do.
775949	Nov. 29, 1904	.....do.....	Do.
779638	Jan. 10, 1905	Burton.....	Carrier for pneumatic dispatch apparatus.
780595	Jan. 24, 1905	.....do.....	Do.
782106	Feb. 7, 1905	Stoddard.....	Pneumatic carrier.
783151	Feb. 21, 1905	.....do.....	Pneumatic dispatch apparatus.
784225	Mar. 7, 1905	Pike.....	Do.
790456	May 23, 1905	.....do.....	Pneumatic dispatch tubes.
790457	.....do.....	.....do.....	Do.
796263	Aug. 1, 1905	Stoddard.....	Carrier for pneumatic dispatch tube apparatus.
800884	Oct. 3, 1905	.....do.....	Pneumatic dispatch apparatus.
1040810	Aug. 22, 1912	K. E. Stuart.....	Electric dispatch system.
1040811	Oct. 10, 1912	.....do.....	Do.
¹ 693974	.....do.....	.....do.....	Do.
¹ 581208	Pending.....	.....do.....	Do.
¹ 693973	.....do.....	.....do.....	Do.

¹ Serial number.

In a report of the Pneumatic Tube Commission, made in 1908, on page 30 there is an estimate of what is known as the percentage of operation, showing the efficiency of the pneumatic tube and how much of its efficiency was utilized. The commission figured its calculations on a basis of the transmission of some 4,800 carriers for a period of 20 hours' operation in each direction for a day, or on a basis of a headway of from 13 to 15 seconds per carrier. Now, in Philadelphia at the present time, and also in the history of the industry there, that has not been an accurate statement of the situation, as we transmit carriers there on a headway from 6 seconds up to 10 seconds without a particle of difficulty, owing to the type and character of our machinery.

I have here a statement showing a comparison of the Philadelphia tube service on November 1, 1912, with the tube service as given in the Pneumatic Tube Commission report of 1908. This comparison is made for the purpose of showing the increase in the use of the pneumatic tube in the four intervening years from the time of the report made by the commission in 1908 until the date that we have

used here, which is November 1, 1912. The tube carriers dispatched from the post office to the Pennsylvania Railroad station, as given on page 59 of the commission's report, and to the various other lines, are enumerated in the second column. The percentage of operation is given in the third column and is shown on page 30 of the 1908 report of the Pneumatic Tube Commission. In the report, through some slight miscalculations, the percentage as figured out is a little erroneous, and I have shown the corrections in the third column.

The percentage of operation is calculated on the basis of a maximum dispatch of 9,600 carriers in both directions in a period of 20 hours, and it figures out at 33 per cent on the general post office to the Pennsylvania Railroad line, and on the Pennsylvania Railroad line to Station J the percentage of efficiency instead of being 4.5 is 6.6; from Station J to Station C the percentage instead of being 2.75 was, in 1908, 4. In the case of the general post office to Station S the percentage of efficiency instead of being 5.5 was 8.3; from Station S to Station O the percentage instead of being 3.5 was 5.4. In the fifth column there is shown the number of tube carriers dispatched on November 1, 1912, and in the sixth column is given a percentage of the various lines of operation based on an efficiency of a maximum of 9,600 carriers both ways. You will notice that the percentage figured out for the general post office to the Pennsylvania Railroad Station is 44.3; Pennsylvania Railroad Station to Station J, 11.4; Station J to Station C, 6.5; from the general post office to Station S, 22.5; from Station S to Station O, 20.7; from the general post office to the Bourse Station, 35.5; from the general post office to the Southwark Station, 10.6; from the Southwark Station to Station D, 6.06; from the general post office to the Reading Terminal, 12.8; from Station O to Fairhill, 17.4; and from Fairhill to North Philadelphia, 10.4.

The percentage of increase as shown by the records of November 1, 1912, over the records as given in the report of the Pneumatic Tube Commission of 1908 is enumerated in the last column. It shows the percentage of increase in what is known as the general post office to the Pennsylvania Railroad Station line as 34.2; the Pennsylvania Railroad Station to Station J line, 72.7; the Station J to Station C line, 62.5; the general post office to Station S line, 171; and you will notice that these figures now become very interesting; the percentage of increase from the Station S to Station O line is 283.3; and the increase on the general post office to the Bourse Station line 117.7. The remaining lines, of course, were not operating in the year 1908.

Mr. STEWART. What was the basis you used, Mr. Murray, for your percentages?

Mr. MURRAY. That question immediately raises another question: Was every carrier dispatched filled with mail? Our basis of calculation is the number of carriers transmitted over the line during that period, and candor compels us to acknowledge that some of those carriers were not filled with mail, especially when there was a heavy mail transported between two points. It is sometimes necessary to send back certain empty carriers in order to transmit all the mail between the two points in question.

Mr. STEWART. What is your basis for figuring your rates of percentage? That is, what is the frequency of your dispatch?

Mr. MURRAY. The percentage that I have used is the percentage that was used in the 1908 report, which is a maximum transmission of 9,600 carriers, being considered 100 per cent. Now, that, of course, while it was used by the commission in its investigation on that occasion, is not the situation with our lines. All our lines have what are known as open receivers. In the place of emerging from the pneumatic-tube line by going through a gated or valve device, our carriers emerge in the open air by going up through the basement of the post office and killing the carrier's velocity by the centrifugal receiver, which allows the carrier to come in uninterrupted. In a heavy mail transported between the central post office and the Broad Street Station we frequently send carriers on a four-second headway. On a four-second headway the number of carriers that can be transmitted is something startling. I think it figures out in the neighborhood of 36,000 carriers for a period of 20 hours' duration. I feel confident that we could operate the Philadelphia lines for a period of 20 hours and transmit through those lines in both directions at least 28,000 carriers, although the commission in 1908 figures the maximum efficiency at 9,600 carriers per day.

Mr. STEWART. What headway would that be?

Mr. MURRAY. A five-second headway, or 12 carriers per minute.

Mr. STEWART. Nine thousand six hundred carriers?

Mr. MURRAY. No; 9,600 would be in the neighborhood of 15 seconds; 28,000 carriers transmitted in both directions for a period of 20 hours would be at a headway of 5 seconds, or 12 per minute, or 720 per hour, or 14,400 in one direction and 28,800 in both directions. That is to say, speaking from my knowledge of the matter and my familiarity with the operation of the company, I feel that we can transmit that number of carriers through any line the commission suggests.

The table referred to by Mr. Murray as showing the comparison of the Philadelphia tube service on November 1, 1912, with the tube service as given in the Pneumatic Tube Commission report of 1908, is as follows:

Comparison of the Philadelphia tube service on Nov. 1, 1912, with the tube service as given in the Pneumatic Tube Commission report of 1908.

Line.	Miles.	Tube carriers dispatched as per 1908 report. (See p. 59.)	Per cent of operation given in report of 1908. (See p. 30.)	Per cent of operation as given in report corrected.	Tube carriers dispatched Nov. 1, 1912.	Per cent of operation on Nov. 1, 1912.	Per cent of increase.
General post office to Pennsylvania R. R. Station.....	0.72	3,171	33.0	33.0	4,262	44.3	34.2
Pennsylvania R. R. to Station J.	1.23	641	4.5	6.6	1,096	11.4	72.7
Station J to Station C.....	.88	392	2.75	4.0	625	6.5	62.5
General post office to Station S..	1.41	802	5.5	8.3	2,162	22.5	171.0
Station S to Station O.....	1.21	522	3.5	5.4	1,990	20.7	283.3
General post office to Bourse Station.....	.56	747	16.3	16.3	1,620	35.5	117.7
General post office to Southwark Station.....	1.015	.....	.....	.....	1,027	10.6	.....
Southwark to Station D.....	.872	.....	.....	.....	581	6.06	.....
General post office to Reading Terminal.....	.279	.....	.....	.....	1,230	12.8	.....
Station O to Fairhill.....	1.164	.....	.....	.....	1,675	17.4	.....
Fairhill to North Philadelphia...	.623	.....	.....	.....	1,006	10.4	.....

NOTE.—The percentage of operation is calculated on the basis of a maximum dispatch of 9,600 carriers in both directions in a period of 20 hours or 4,800 each way.

In the Pneumatic Tube Commission's report of 1908, on page 9, under the subject of "Headway," the following appears:

The closest interval between two carriers originally expected to be six seconds, is now 13 to 15 seconds, so that the total number of letters dispatched one way per hour is rated at 108,000 instead of, as in the early days, 360,000.

The argument which I have just advanced to this commission is pertinent to that point. In the early days of pneumatic-tube service the number of letters transmitted in a carrier was supposed to be some 600, although at the time of the report of the commission of 1908 the commission figured on a basis of some 450 letters being transmitted in each carrier, which consequently would cut down the number of letters very materially. The mere fact that the commission's conclusion as to 450 letters is probably true in no way cuts down the capacity of the carrier. Its cubic contents are absolutely the same they were when the 8-inch tube was put in operation, but owing to the advance in the use of the typewriter the tendency now when transmitting a letter is to fold that letter only two times and to send it in such a way that it occupies more space. In the old days they folded a letter until it presented six sections and used a short letter. To-day a majority of the envelopes are very large; that is, in comparison with what they were in the infancy of the pneumatic-tube system.

The availability of the tube service is something that commends itself very highly to the transportation of mail; in fact, in the city of Philadelphia to-day we connect up our 10 miles with 12 postal stations. As I stated, the lines range from a quarter of a mile in length to 1.41 miles in length, and it means 22 individual lines, or 11 double lines. That means that in the transportation of mail we have 22 individual lines, each one of which is capable of transmitting every minute 12 carriers, or a gross number of carriers transmitted during a minute's time in our system of 264. The weight that is transmitted in an individual carrier is approximately 20 pounds of mail matter, or each minute our system can transport 5,280 pounds, and that first-class mail matter is worth \$1 per pound. It has often been stated that the tube service is extravagant; that it has cost more than it justified. When you take into consideration that a screen wagon traveling 1 mile costs in the neighborhood of 38 cents, a trolley car approximately 20 cents per mile, and automobile from 22 cents to 32 cents, the pneumatic-tube service amply justified itself for mail transportation. As the report of 1908 shows, the cost of transporting a letter by pneumatic tube was less than six-tenths of 1 mill.

In an investigation concerning the purchase of the physical property of any corporation, the question naturally presents itself: What is that property worth?

Mr. MURDOCK. Before you go into that matter there is one question about the system concerning which I would like some information. There is a system from the general post office to the Bourse Station, and in the report of 1908, on page 27, this notation appears under the subhead "Philadelphia":

The postmaster reports that the 6-inch tube line between the general post office and the Bourse Station is inadequate for satisfactory service and should be increased to an 8-inch line.

Was any such increase made?

Mr. MURRAY. No, sir; the line to-day exists as it was in 1908, and as it was in 1892.

Mr. MURDOCK. It is the same line?

Mr. MURRAY. It is the same identical line; there has been no increase in it in any way, shape, or form, except that we have made a slight change in the terminal machinery.

Mr. MURDOCK. And so far as inadequacy is concerned, there has been no change in the service between those points save as is evidenced in this table that you have just spoken of?

Mr. MURRAY. So far as the inadequacy of the line is concerned there has been no change. While the postmaster in that report stated that the Bourse line was inadequate, I think that instead of the inadequacy of the line to transport the mail what he had in mind was that the line did not allow interchangeability of carriers between the lines. You see all the other lines are 8-inch tubes. The Bourse line, of course, being the infant of the development of the system, was only 6-inch. It has remained 6-inch. While the postmaster stated that the line was inadequate, as a matter of fact, we do not find it so in actual operation.

Mr. MURDOCK. As you say now that you are getting 35 per cent efficiency out of it, or did on November 1, an increase of 117 per cent over the dispatch of mail in 1908; so it has increased despite the item of interchangeability?

Mr. MURRAY. Those are the figures at which I arrived, 117 per cent, and that is the situation. There is a slight transshipment of carriers that are probably empty. We endeavor to keep at each end carriers enough to transmit the mail as it arrives, but when the heavy mail arrives at one end it may be necessary in order to bring that up to send back some carriers.

Mr. MURDOCK. If the postmaster at Philadelphia in 1908 said that this line was inadequate, possibly because of the fact that it is a 6-inch tube and the others are 8-inch tubes, thus bringing in this item of interchangeability, and we find now that there is an enormous increase of 117 per cent in the efficiency of that tube, what was the cause of the inadequacy in the old days; was it a lack of mail?

Mr. MURRAY. The idea that was probably in the postmaster's mind then was not any inadequacy in the transportation of the mail, but the inadequacy as to the interchangeability of carriers.

Mr. MURDOCK. Now, eliminating what was in the postmaster's mind, let us take the fact that in 1908 the efficient use of that tube was 16 per cent and to-day it is 35 per cent. What gives that tube the use of 35 per cent efficiency to-day as against the 16 per cent efficiency?

Mr. MURRAY. The increase in the number of carriers transported is what raised the efficiency.

Mr. MURDOCK. But why did they use it only 16 per cent four years ago as against 35 per cent to-day? Was it due to the failure of mail to be presented for transportation? Was it lack of efficiency in the tube mechanically? How do you explain the difference between the 16 per cent and the 35 per cent?

Mr. MURRAY. I explain it by the increase of the mail.

Mr. MURDOCK. That is what I wanted to know. More mail was offered, then, this year than four years ago.

Mr. MURRAY. It evidently was offered for us to transport on the day I have taken for making this record, and if it had not been offered, of course, we would not have transmitted the carriers containing the mail.

Mr. MURDOCK. Of course I am not looking at it purely from your view as offering tube service to the Government; I am wondering why this tube was only used to 16 per cent of its efficiency four years ago and it is used 35 per cent to-day. Your answer seems to be that it was because mail was not offered for transmission through that tube in 1908 to a volume that would make its use 35 per cent.

Mr. MURRAY. Unquestionably there was nothing else that would justify the increase in the transmission of carriers unless we would undertake to be so foolish as to send carriers for no purpose whatsoever. Of course, that is incredible and not to be considered for a moment. I have taken this record as it was furnished to me by the operating superintendent.

Mr. MURDOCK. I am not impeaching your record here as to the dispatch of mail on November 1, 1912, but I am trying to arrive at the reason for the enormous increase in the efficiency of this tube in the last four years, and while you have no knowledge as to the amount of mail presented at the post office, I thought you would have some notion as to why that increase was made.

Mr. MURRAY. The only conclusion forced upon one is that the mail increased. Every line we have here, even the Broad Street Station line, increased in the intervening four years.

Mr. MURDOCK. Now, to get down to brass tacks on that point: In 1908, then, sufficient mail was not offered on this line to really give a full value to the Government in the use of this tube?

Mr. MURRAY. I can not agree with that conclusion. I feel that the use of the tube was amply justified, not only in 1908, for the amount of mail it transported, but is even to a greater extent justified to-day.

Mr. MURDOCK. And you believe now that with a further offering of an increased volume of business on this line that the efficiency of this tube will be still further increased?

Mr. MURRAY. I do. At the hearing of December 3 last there was some comment made in regard to the Uphams Corners line.

Mr. MURDOCK. Yes; I brought that matter up.

Mr. MURRAY. In the report of 1908 that line showed a percentage of efficiency of some 2.02, and the question was asked the operating manager, I believe, of the American Pneumatic Service Co. whether he justified the installation of a tube at that point. As I recall it, the answer was that the installation of the tube had been recommended by a certain commission in the Post Office Department, but from my knowledge of the operation of the pneumatic-tube service and my observation of the transmission of mail by that service I feel that although the Uphams Corners Station only had a mail receipt of \$37,000 per year it was justified in installing a pneumatic-tube service to that station.

The CHAIRMAN. Why?

Mr. MURRAY. Because the Uphams Corners line is in the nature of a residential line, and the mail receipts would be no positive criterion as to the amount of mail transported. In other words, the

mail would go into that station rather than originate there. Consequently, the postal receipts of that station would not be as great as if it had been a down-town post office or a post office located near the heart of the city of Boston, where the stamps would be purchased. Then I also think—although it is only my opinion—that mail is transported to a station like Uphams Corners in the same way it is to some of our stations, and then goes to points beyond. For instance, take the enormous volume of increase of certain of our lines as given in this table of comparison. Take the lines from Station S to Station O, which shows an increase of 283.3 per cent over 1908. The explanation of that was the fact that we built the North Philadelphia and Fairhill line, which made a tube line reaching from the central post office to the North Philadelphia Station, and allowed the mail that used to formerly be shuttled from Broad Street to North Philadelphia to connect with the through trains that did not go into Broad Street Station to take on their mail at North Philadelphia, which means, of course, a great diversion of mail that in the course of events would have gone by way of Broad Street Station. The construction of that line has brought out one very good feature of the pneumatic-tube service; and that is that a banking house, or any other house that has correspondence of a very important nature, was unable to get that correspondence out of the city if it was going to Chicago, because the last train that left Broad Street Station for Chicago—this is just my recollection, and I do not pretend to speak with absolute accuracy regarding the matter—the last train that left Broad Street Station for Chicago was at 4.53 o'clock, and it arrived in Chicago on the next evening at 5 o'clock; whereas the train leaving North Philadelphia, the 18-hour train, left North Philadelphia at 5.36 and arrived in Chicago the next morning.

Mr. MURDOCK. Does it come into Broad Street Station?

Mr. MURRAY. No; it goes by a cut-off. It does not come even to West Philadelphia. That enabled banking houses there and everyone else to make a considerable saving in the transportation of their mail going to Chicago. There is, therefore, a gain of a day in the transportation of this mail to a city like Chicago, allowing a day's increase of interest in all banking houses. So we have given the city of Philadelphia an immense advantage through the construction of this tube.

Mr. MURDOCK. I wish you would get this idea: The Government is asked to purchase or to consider the feasibility of purchasing tubes. The tubes must necessarily have this great advantage. They must expedite a certain amount of the mail. Now, it is to the advantage of the Government to expedite just as great a volume of mail as possible, and if we construct a tube anywhere or have a tube constructed and offered us anywhere which has not a volume of mail offered to transport, I can not see where the Government ought to own or hire that tube. It is not a matter of expediting a small amount of mail. The Government must have a sufficient volume of mail offered to expedite to make it worth while to have a tube. We can not put an expenditure of \$17,000 a year per mile in a service which will expedite a small amount of mail, and I tried unsuccessfully to get this idea to you: That in 1908, on one of these tubes in Philadelphia, we had an efficiency service there of 16 per cent as against a present

record of 35 per cent. The idea I tried to convey to you was this: That this Government evidently had in 1908 a tube that was not giving it real service, because it had a tube constructed at a place where a sufficient volume of mail did not offer to make for an economic service. In other words, in all the testimony I have heard you give this afternoon you do not seem to take into consideration that the Government in its function in this service has a right to have a tube at a place where sufficient mail is offered to make the service economical to the Government.

Mr. MURRAY. I recognized absolutely that the Government has a right and should of necessity receive value for the money that it pays for the tube service, and if the mail at a certain point is not sufficient to justify a tube, that tube line should not be placed in service; it is absolutely a perfect waste of money to place a tube into a station and to equip the station with the service; but the question arises, When is that point reached? Is it reached when the number of carriers transmitting mail to that station is 200 per 20 hours operation?

Mr. MURDOCK. You and I would be in entire disagreement on that point, but I think it is not reached by any means when the transportation between two given points anywhere makes the efficient use of the tube 2 per cent, as in the case of Upham Corners.

The CHAIRMAN. Is that the only illustration?

Mr. MURDOCK. The Upham Corners case is the one where the efficient use of the tube is 2 per cent, and I think that is an outrage upon the Government. I am sure that I would not pay \$17,000 a year per mile for that sort of service.

Mr. MURRAY. The feature that you must take into consideration in considering the pneumatic-tube service is this: The tube service practically places the entire city served by the post offices and the stations that it connects in instantaneous communication one with the other. The postal stations are almost within the same roof and are considered only a few minutes apart. The postmaster of one station, a mile or 2 miles from the central office, walks to a transmitter and drops his money into the carrier and sends it to the central office, and in a few minutes he has gotten back his stamps. The mail, no matter where it is going or when it arrives, is placed in a carrier and it is on its way. If a train is ready it is there to be taken. To say that 200 carriers of mail transmitted into a station would not justify it, ignores the fact that if you take the tube service as an entirety you will find that the transmission of the letters in those tubes only costs the Government a very slight sum, some six-tenths of 1 mill; that the cost per carrier-mile as a unit of mail transported is only one-half of 1 per cent; and your screen wagon may cost 38 cents. The carrier transmitting 450 letters each way from 10 to 20 points means some \$20 in revenue to the Post Office Department.

Of course, it would be folly to undertake to credit that revenue to one branch of the postal service. It is only a limb of the tree. Another feature you must take into consideration is this: When you build a tube system, and you have every station within the confines of the city connected up, you have a system of the very highest order of efficiency. Every additional station that you connect up not only

increases the tube service and means a new line per se, but it creates and aids the existing stations. It is somewhat like building an additional room to your house; you have your room and you have a better house. As I have shown in our North Philadelphia Station, when they put 2 miles additional into the tube system there they improve the service wonderfully. They made possible a connection that had been before impossible. It gave every other station connected up with the North Philadelphia and Fairhill Stations instantaneous communication, something they did not have before. Those two stations were highly benefited, and so were the other stations. Take the Boston situation, in which district the Uphams Corners Station is located. Of course, it is not handling a great volume of mail. I think, now, it is doing better than 2.2 per cent. Yet Uphams Corners brings about practically an instantaneous communication with the Boston post office. It gives the people a facility that they would not otherwise have had.

Mr. MURDOCK. I did not want to divert you from the financial statement you were making. You may proceed now with that.

Mr. MURRAY. As I have already stated, the outstanding securities of the Philadelphia Co. amount to \$1,696,900, made up of some \$500,000 in common stock, \$200,000 in bonds, and \$996,900 in preferred stock.

The CHAIRMAN. What interest is the preferred stock paying?

Mr. MURRAY. It is at present paying 6 per cent, and the bonds are 5 per cent 20-year gold bonds.

The CHAIRMAN. Has the preferred stock paid regular dividends?

Mr. MURRAY. It has paid regular dividends since 1908. Of course, you must remember that since the year 1905 our pneumatic-tube properties in Philadelphia have been augmented some eightfold. In 1905 we had the Bourse and Broad Street Stations, consisting of an aggregate mileage of about 1.27, and since 1905 we have expanded from 1.27 to 10 miles. Consequently, in the early years we did not pay any dividends. The common stock has been issued and outstanding since 1892, and has paid no dividends in all that time.

The CHAIRMAN. Am I correct in my undersanding that your company made \$85,000 a year?

Mr. MURRAY. The earnings statement for the year ending March 31, 1912, shows a profit on operating of \$84,376.01. It is enough to pay the fixed charges and enough to pay our bond interest, and it allows a slight surplus in excess of that, but not sufficient to justify the payment of a dividend on the common stock.

Mr. MURDOCK. Will you kindly state again what the common stock amounts to?

Mr. MURRAY. \$500,000; it was issued in 1892.

Mr. MURDOCK. What is your bond issue?

Mr. MURRAY. The bond issue is \$200,000; and the preferred stock is \$996,900.

Mr. MURDOCK. And the bonds are 5 per cent bonds?

Mr. MURRAY. Five per cent bonds.

Mr. MURDOCK. And the earnings are how much?

Mr. MURRAY. The earnings as shown by a statement for the year ending March 31, 1912, are \$84,376.01. We have a total of the outstanding securities of \$1,696,900.

Mr. MURDOCK. What is your common stock quoted at now?

Mr. MURRAY. As a matter of fact, our common stock is very closely held. It has never been listed on any exchange, and I could not give you a quotation on it.

Mr. MURDOCK. Was it given originally as a bonus?

Mr. MURRAY. I will give you the situation. In 1892 the Bourse line was constructed under the administration of Postmaster General Wanamaker. On page 15 of the report of the Pneumatic Tube Commission of 1908 a statement appears under the subhead "1892," as follows:

The Pneumatic Transit Co. of New Jersey is already putting down tubes in Philadelphia between the general post office and the East Chestnut Street postal station, to be completed soon after December 1, 1892. He is informed that the company is at an expense of \$25,000, and the Post Office Department can try the system for one year without expense, and may then rent, purchase, or reject it without incurring any liability.

We have often wondered where that statement originated. We have never been able to ascertain just where those figures were obtained. As a matter of fact, the construction of that line was approximately \$42,000. Of course, it was the pioneer of the industry. It was the first large tube that had ever been successfully constructed in the world. The difficulties that were encountered are the difficulties in the overcoming of which they succeeded in creating the enterprise. In order to build that line it was financed by an issue of \$300,000 of common stock. Five hundred thousand dollars was the capitalization, and \$300,000 of it was issued for the construction of the Bourse line. The patents that the company then purchased were received in exchange for \$200,000 of common stock, making up the total of the company's then capitalization of \$500,000 in 1893.

Mr. MURDOCK. That is very important, and I wish to get it absolutely correct. You say there was an authorized issue of \$500,000?

Mr. MURRAY. \$500,000 in common stock in 1892.

Mr. MURDOCK. \$300,000 of that was disposed of?

Mr. MURRAY. It was given to the contractors who constructed the Bourse line.

Mr. MURDOCK. Did they in turn dispose of it?

Mr. MURRAY. They unquestionably did dispose of it.

Mr. MURDOCK. That is what I want to get at. Is there any record or any way of finding out what they got for the \$300,000 in common stock?

Mr. MURRAY. I have a statement here——

Mr. MURDOCK. But not going into the statement, is there any way of finding out what the contractors got for the \$300,000 of common stock?

Mr. MURRAY. There is no way that I know of. The gentleman to whom that stock was issued, I think, is dead. He was the late lamented William J. Kelley, and the stock was issued for the construction of the line.

Mr. MURDOCK. What did Mr. Kelley do with this \$300,000 in common stock when he got it?

Mr. MURRAY. He made every effort to dispose of it.

Mr. MURDOCK. He took it en bloc to some banker and said, "How much will you give me for this common stock?"

Mr. MURRAY. You must remember that nothing had been done like this before, and as the postmaster, in his report of 1892, says:

The Post Office Department can try the system for one year without expense, and may then rent, purchase, or reject it without incurring any liability.

It would have been akin to madness to have entered a bank with a proposition to dispose of \$300,000 of common stock issued by an enterprise that was embarking into something that was pioneering absolutely. Mr. Kelley did everything he possibly could to dispose of that stock, and in disposing of it he was assisted by our secretary, so far as our secretary's efforts were successful.

Mr. MURDOCK. Do you mean by that that he sold to individuals?

Mr. MURRAY. He sold to individuals time and again, and for any price he could receive. In the early days of the tube construction it was looked upon as a gold mine; they have since changed their view of it in that respect. In those early days it probably brought a greater price than it did later. In his efforts to dispose of the stock I believe he encountered all manner of difficulties.

Mr. MURDOCK. I am glad you cleared that matter up.

Mr. MURRAY. We have nothing at all to conceal.

Mr. MURDOCK. I wish you would kindly explain about the \$200,000 and the patents.

Mr. MURRAY. I will explain that. The \$200,000 of the common stock was issued in exchange for the patents, and that \$200,000 of common stock met a like fate. It in all probability was sold wherever they could find a market and where they could persuade an investor to invest.

Mr. MURDOCK. That is, the inventor who had these various devices presented himself to this new company and received in exchange for these devices \$200,000 in common stock.

Mr. MURRAY. \$200,000 in common stock.

Mr. MURDOCK. He had the same difficulty, of course, in disposing of that stock that Mr. Kelly did?

Mr. MURRAY. If anything he had greater difficulty.

Mr. MURDOCK. And there is no record anywhere which shows what part of the \$500,000 in common stock finally reached the form of money.

Mr. MURRAY. Of course, it would be very hard to view it in that light, that is that it finally reached the form of money, but the question arises, have we squeezed the water out of it? That is the thing. I have prepared a statement here in which I have endeavored to show——

Mr. MURDOCK. I wish you would first proceed with the history of the matter.

Mr. MURRAY. In 1897 the company then of course had expended this entire stock capitalization of \$500,000 to purchase the Bourse line and the patents. The Broad Street line in 1897 was constructed by an issue of \$200,000 of bonds. That was the only construction then until the year 1905. Then the lines from the central post office to Stations S and O were constructed; they were financed by an issue of preferred stock to the extent of \$160,000, I think. In 1907 the Station C lines were constructed, and they were financed by an issue of \$200,000 of preferred stock, and the mileage constructed was some 2.12. In 1908 the Southwark and D lines were constructed,

which also included the construction of the Reading line. Of course, while these were short lines, they required the same terminal apparatus as they would have required had they been longer lines. For the Southwark and D station lines there were issued \$235,000 of preferred stock. That was in the year 1908, and in the year 1910 in order to construct the last lines that were constructed there was issued \$199,750 of preferred stock.

In order to secure a device, the merits of which will be explained later by our engineers, we issued \$100,000 of preferred stock; that was for the electric-tunnel rights of the city of Philadelphia and within a radius of 20 miles of the city of Camden. That makes up a total capitalization of \$1,696,900.

Mr. MURDOCK. Now, from your statement, the understanding I get is this: That your first issue was \$500,000 of common stock; that thereafter you issued \$200,000 in bonds, and thereafter \$996,000 of preferred stock. Do your bonds, amounting to \$200,000, lie against the whole property?

Mr. MURRAY. The mortgage which covers the bonds does not contain an after-acquired property clause, but, of course, the payment of the mortgage would be incumbent upon the mortgagor.

Mr. MURDOCK. What about the condition of the bondholder on your further issue of preferred stock? He could not be affected, could he, in the least by the issue of preferred stock?

Mr. MURRAY. The lien on the bonds would supersede any lien that could be created either by common or preferred stock. The bondholders are the creditors.

Mr. MURDOCK. I understand, but I asked that question in order to follow it up with another question. What was the condition of the common stockholder when you issued the preferred stock?

Mr. MURRAY. The condition, so far as we can throw any light upon it, was one of acquiescence. They realized they had an infant in swaddling clothes. Then there was a certain reexistence promised. The industry was vitalized. You might say, of course, that the common stockholders would be only too glad to see further construction, because the operations that had been conducted through the years from 1892 to 1897 were not showing a profit, owing to the fact that there was the same overhead expenses. There was the same administration, the same executive charges, such as office rent and telephone and taxation, etc., as though there had been a plant of ten times the size. In other words, when the plant is very limited the overhead charges are necessarily greater.

The CHAIRMAN. Did any of the shareholders of the common stock purchase preferred shares?

Mr. MURRAY. Yes; they did to a great extent. William J. Kelley was also among the purchasers of the preferred shares. I think William J. Kelley died some three years ago, and in his will there is a clause to the effect that the rest, residue, and remainder of his estate is to be devoted to a home for orphans, and among the securities of the Kelley estate are unquestionably quite a number of our securities, both common and preferred stock and also the bonds. In fact, if my recollection serves me right, I think they hold 57 of our bonds.

Mr. MURDOCK. During all these years the common-stock holder has not gotten anything?

Mr. MURRAY. Not one penny per se.

The CHAIRMAN. How long a franchise have you in the city of Philadelphia?

Mr. MURRAY. The franchise in the city of Philadelphia, a copy of which I have submitted to the commission here and which has been incorporated in the record, was granted in 1897 and allowed construction to any post office within the city limits of Philadelphia and allowed the laying, of course, of our tubes.

One of the important things that I have so far neglected to mention is that our system is underlaid with a six-way terra cotta duct. In all construction undertaken since 1905 we have provided ourselves with a six-way terra cotta duct, so that in case of any emergency we can have our own telephone and power connections from station to station. We are at the mercy of no one. The ordinance of 1907 provides that we can lay our pneumatic tubes and electric conduits within the confines of the city of Philadelphia and connect up with any postal station therein, and can also connect with the power house if it is located within two squares of any of our lines, the idea being that when prosperity was upon us we would construct our own power house. The only obligation that we are under with the city of Philadelphia, in connection with the ordinance, is that we file a bond of \$25,000 to the city, and then, of course, we have the necessary charge of 5 per cent for inspection of repaving.

The CHAIRMAN. For how long is your franchise in Philadelphia?

Mr. MURRAY. The franchise is limited as to construction to the year 1912, but, of course, the construction already in existence at that date the city could have no confiscatory powers over.

The CHAIRMAN. Do I assume, then, that you have a perpetual franchise?

Mr. MURRAY. As to existing lines; yes; but we could not tomorrow start in and construct ad lib. in the city. They allowed us to go ahead for five years under the franchise of 1907.

Now, I have given you the manner in which our securities were issued and for what they were issued. There is no attempt to evade the issue in any way, shape, or form. We are doing all in our power to help and assist you in arriving at a conclusion in this matter.

We have compiled a statement here and that statement we have gleaned from various sources, but it is compiled along these general lines: We take the actual cash moneys that entered into the Bourse line in 1892 and we find that it is \$42,000. We have allowed for the year 1893 unpaid interest on that sum, \$2,520. I do not want to unnecessarily take up the commission's time in rehashing this, as I intend filing it with you, but I want you to grasp the purpose and how we arrive at these figures.

Mr. MURDOCK. I think it would be a good plan for you to proceed with this matter item by item. What rate of interest do you allow on that money?

Mr. MURRAY. Six per cent. To-day when industrials pay 7 per cent, and there is a dearth in the market, 6 per cent is not an exorbitant rate for us to allow; but we have started with the amount actually invested in the Bourse line in the year 1892 as being \$42,000. We have compiled this statement under a tabulation of each year. In the year 1893 there is unpaid interest, \$2,520. We have also allowed a sum for unpaid officers, \$12,000. We have also estimated

loss in operation during the year 1893 as \$12,000. Now there is this justification for our estimate of unpaid officers at \$12,000. While the corporation was only an infant at that time, it is in the early days of a corporation that the actual work must be done. The energy, the initiative and all that goes to create an enterprise has got to be considered, and we have estimated \$12,000 under the item of unpaid officers. This is ignoring the salaries to our directors.

The CHAIRMAN. Did I understand you to say salaries of your directors?

Mr. MURRAY. I say it is ignoring anything in the way of salaries or fees to our directors. In other words, we are counting \$12,000 in the year 1893 as a proper remuneration to our officers. They did not receive it, however.

Mr. STEWART. Is that itemized?

Mr. MURRAY. No; it is not itemized any more than we would apportion it among the president, secretary, and treasurer in probably equal sums. You can apportion it as you wish. This enterprise was created; men had to do it. They had to have executive heads to carry on the corporation. It is true they acted for nothing. They received nothing. It is also true they held the common stock. This is how I expect to show that the water was squeezed out completely and absolutely.

Mr. STEWART. You say it is not itemized, but you must have had some way of arriving at it.

Mr. MURRAY. A justifiable sum would be \$4,000 a man for those three officials. That ignores the directors.

The CHAIRMAN. I did not know that directors received any salary.

Mr. MURRAY. The directors, especially in a struggling industry, do devote some time and attention to the business. Of course, we made no attempt to compensate the directors, because the directors, at least two of them, were officers of the company; but there is no estimate in arriving at this conclusion of anything for the directors. In other words, there are no directors in the calculation whatsoever.

Mr. MURDOCK. The president and the secretary and the treasurer; are those the three officers?

Mr. MURRAY. Yes; the president, the secretary, and the treasurer.

Mr. STEWART. I assume that those items are carried in the operating expenses now somewhere.

Mr. MURRAY. As a matter of fact they are not carried in the operating expenses at the present time. We do not to-day pay a salary equivalent to \$4,000 to any officer of the company. Two officers act without any remuneration, and one receives less than \$4,000. So that to check me up, as it were, by looking at the operation for the last fiscal year it would be impossible. What I am attempting to do is to justify the securities that have been issued for these properties and to show that they are of value, and we are arriving at it by this tabulated statement.

The first item considered in the year 1893 was \$2,520 for unpaid interest; and for unpaid officers, \$12,000; loss in operation \$12,000. Those three sums when added to our original capital with which we began business in 1893 make a total of \$68,520. That was what we started with in the year 1894.

Mr. STEWART. What was the third item you referred to?

Mr. MURRAY. Loss in operation. That is estimated.

Mr. STEWART. How is that arrived at?

Mr. MURRAY. You might say that we have arrived at it at the best of our ability. We do not pretend to speak by chapter and verse and to lay a finger on every dollar we lost.

Mr. MURDOCK. Why not \$10,000 instead of \$12,000? How do you arrive at the \$12,000?

Mr. MURRAY. I will have to refer you to Mr. Stuart, our engineer, for information on that subject. I have only been connected with the company a matter of four years and a half. I am not an engineer, but am an attorney at law.

Mr. STEWART. You mean Mr. Kenneth E. Stuart, the engineer, do you not?

Mr. MURRAY. Yes, sir; our engineer. The figures for the loss in operation were compiled by Mr. Stuart. If you ask him I presume he can give you positive information as to how he arrived at those figures. Later on we can show it to you with absolute ability to show the reason for it.

In the year 1894 the unpaid interest on our capital of \$68,520, made up as I stated, would be \$4,111; unpaid officers, \$12,000, the same sum as for the previous year; alterations in the year 1894, \$10,000. In that year the Bourse Building was built, and the East Chestnut Street postal station was moved around to the Bourse Building, so that it was necessary to take our plant out of the East Chestnut Street postal station and move the terminal to the Bourse station. We have estimated that \$10,000 as a proper and justifiable capital charge. The estimate of the loss in operation during that year is \$8,000. These items added to the sum of \$68,520 make a total of \$102,631.

In the year 1895 we calculated unpaid interest on the \$102,631 as \$6,158; unpaid officers, \$12,000; loss in operation (estimated), \$8,500, bringing our capital invested in the business at the beginning of the year 1896 to \$129,289.

In the year 1896 the unpaid interest was \$7,757; unpaid officers, \$12,000; and the loss in operation \$8,500, making a total at the beginning of the year 1897 of \$157,546.

In the year 1897 the interest charge was \$9,453; unpaid officers, \$12,000; and loss in operation, \$8,500, making a total of \$187,499 as our capital at the beginning of the year 1898.

The unpaid interest for the year 1898 is \$11,250; the item for new construction, as represented by the Broad Street line, is estimated at \$60,000, actual cash invested; and the item for unpaid officers in the same year \$10,000; loss in operation, \$5,000; or our capital invested at the beginning of the year 1899 was \$273,749.

The interest on our invested capital in the year 1899 was \$16,425. In that year we paid interest at 5 per cent on the \$200,000 of bonds, which, of course, then left to be charged against interest the sum of \$6,425. The item for unpaid officers was \$12,000 and the loss in operation \$5,000, which made our capital at the beginning of the year 1900 \$297,174.

In the year 1900 the interest charge on our capital was \$17,830. We paid as interest on bonds \$10,000, leaving to be charged as unpaid interest \$7,830, unpaid officers, \$12,000, and loss in operation \$5,000, making our capital at the beginning of the year 1901 \$322,004.

In the year 1901 the interest on the capital invested was \$19,320; paid on bonds, \$10,000, leaving a charge of \$9,320 for unpaid interest; unpaid officers, \$12,000; loss in operation \$5,000, leaving our capital at the beginning of the year 1902 \$348,324, on which interest was charged at \$20,000. During that year the tubes were shut down. No appropriation was made. The Government at that time desired to reverse its view on the feasibility of the tubes; consequently an appropriation was not made. Whether it was through some hostility or not we are unable to say. We know that there was no appropriation made, and the lines that year performed no service.

At the beginning of the year 1903 the interest charge was \$22,873; paid on bonds, \$10,000, leaving to be charged against interest \$12,873; unpaid officers, \$12,000; and loss in operation \$5,000, making a total of \$411,096 as our capital at the beginning of the year 1904.

In the year 1904 the interest charge was \$24,666; paid on bonds, \$10,000, leaving charged against unpaid interest \$14,666; unpaid officers, \$12,000; loss in operation, \$5,000; and alterations at Broad Street Station \$2,000, making a total capital at the beginning of the year 1905 of \$444,762.

In the year 1905 the interest charge was \$26,686; paid on bonds, \$10,000, leaving charged as unpaid interest \$16,686; unpaid officers, \$12,000; new construction, central post office to S and O Stations, \$175,700; loss in operation \$5,000, leaving our capital at the beginning of the year 1906 \$654,148.

Mr. MURDOCK. Now, in that year you constructed a new line.

Mr. MURRAY. Yes, sir.

Mr. MURDOCK. Do you remember the amount of preferred stock issued against that line?

Mr. MURRAY. The preferred stock, I think, was either \$160,000 or \$175,000.

Mr. MURDOCK. How much did the line cost?

Mr. MURRAY. We have the cost here as \$175,000. That line was 2.42 miles in length. It is the longest line that we ever constructed.

Mr. MURDOCK. That is, you spent more money in that line than you issued in preferred stock?

The CHAIRMAN. No, Mr. Murdock, he did not say that. He said \$160,000 or \$175,000. From his latter statement it would appear to be \$175,700, which would probably be the cost of the route.

Mr. MURRAY. I can refresh my memory from the balance sheet [referring to the balance sheet]. In the year 1905 we issued \$160,000 of preferred stock to construct the Station S line. I recall now the situation fully. The Station S line cost \$175,000, some \$15,000 in excess of the preferred stock, and the contractor that took the contract I think lost money on the excavation. To show you an example of the difficulties that we encounter in constructing tube lines, especially in the old portions of the city, I will say that in building the lines S and O it took seven weeks to cross one street.

The CHAIRMAN. Where did the balance of the money come from? Did you sell the preferred shares at more than par, or did you draw on your capital?

Mr. MURRAY. The preferred shares were issued for the construction of that line, and it was up to the contractor to make good that liability.

Mr. MURDOCK. He lost that \$15,700?

Mr. MURRAY. Yes, sir.

The CHAIRMAN. And more, if the stock did not bring as much as \$160,000.

Mr. MURRAY. It was up to him to secure the amount. If he did not secure in excess of par for it, he lost.

Mr. MURDOCK. Then, as a matter of fact, the construction of that line cost you only \$160,000?

Mr. MURRAY. I have told you that the securities were \$160,000, and now I am telling you that the actual money put into that line was \$175,700, and that the contractor lost.

Mr. MURDOCK. But it was not that cost to you?

Mr. MURRAY. It was not that cost to us, but I am showing you the process whereby the equities are in the property and the water is squeezed out. The property is worth \$175,700. This line is 2.41 miles in length, and on the normal basis of pneumatic-tube construction it will run over \$200,000. I am placing this in here as the exact figures.

The CHAIRMAN. The real test will come when you figure out what it will cost to reproduce the work.

Mr. MURRAY. But the idea I am trying to present is that there is equity in our securities. I have made a great effort to make myself plain. I am not saying that these lines actually cost the dollars that the stock was issued for, but I am endeavoring to show that our securities have a par value at least in them.

In the year 1906 the interest charge was \$39,249; paid on bonds and stock, \$18,000, making the unpaid interest \$21,249; unpaid officers, \$12,000, or the capital at the beginning of the year 1907, \$687,397.

For the year 1907 the interest was \$41,244; paid on bonds and stock, \$18,000, making the unpaid interest \$23,244; unpaid officers, \$12,000; new construction, Broad Street Station to Stations J and C, \$154,030; making a total capital charge at the beginning of the year 1908 of \$876,671.

Mr. MURDOCK. What was the preferred stock on that new construction; do you remember?

Mr. MURRAY. Do you mean what preferred stock was issued to construct the Southwark and D and the Reading lines?

Mr. MURDOCK. Yes.

Mr. MURRAY. \$235,000, and we approximate it as costing \$170,000. One of those lines is 0.28 mile long. Of course, that would require the same terminal apparatus as in other cases.

Mr. MURDOCK. Was the same process followed in that year as in the former years of giving the preferred stock to the contractor?

Mr. MURRAY. Identically the same.

Mr. MURDOCK. And he got the stock for what?

Mr. MURRAY. He got the stock for reproducing the tangible property there. He had the burden and the onus of marketing the securities, and the man who undertakes a contract of that description requires some sort of daring.

Mr. MURDOCK. He got his 6 per cent, did he not?

Mr. MURRAY. On the security; yes.

Mr. MURDOCK. And he bought his stock below par?

Mr. MURRAY. He secured his stock for constructing the line.

Mr. MURDOCK. But if the line cost him \$170,000——

Mr. MURRAY. Unquestionably he bought it below par, if he secured, as he did, \$235,000 for constructing the line, and he constructed it for \$170,000.

Mr. MURDOCK. And as against the experience of the former contractor, this man got a job that cost only \$170,000 and received 6 per cent on his investment. Did he not get a pretty good thing out of it?

Mr. MURRAY. He was fortunate, if you consider that he could go and market this \$235,000 of 6 per cent stock as easily as you can enumerate the par value.

The CHAIRMAN. The credit of the shares, I assume, was not so good.

Mr. MURRAY. The credit of the shares is met with this proposition: While they are not liable to be confiscated, we have but one customer, and that one customer may arbitrarily refuse for some reason to continue the service.

Mr. MURDOCK. Have you any record anywhere which shows that this contractor did sell his preferred stock and what he sold it for?

Mr. MURRAY. No; we have not. I would not be surprised to know that the contractor is holding that stock. The Kelley estate, as I have stated, is holding some of the bonds that William J. Kelley secured in connection with the early construction.

Mr. STEWART. I understand you are giving us cash figures as to the actual cost of the construction which the contractor had to pay out. You say it cost him so much money, but you turned over this stock to him.

Mr. MURRAY. We turned over \$235,000 of preferred stock to the contractor for the Southwark, D, and the Reading lines, and we estimated that it cost the contractor the sum of \$170,000 to construct that property.

Mr. MURDOCK. Now, did it cost him that?

Mr. MURRAY. We estimated that amount. Mr. Stuart, the engineer, I think, was working on that line, but we have here the contract that immediately preceded that itemized for the Batcheller Pneumatic Tube Co.'s books.

Mr. MURDOCK. What was his bill; do you know?

Mr. MURRAY. They received \$200,000 preferred stock. The total cost of construction was estimated at \$166,462.47.

Mr. STEWART. How do you arrive at that amount?

Mr. MURRAY. The figures whereby we arrive at that amount I have set out here with the most minute detail. The cost of the construction and the installation of the J and C lines are shown. They were constructed in 1907. The details of that construction to the last penny are set out here. I will leave a copy of the statement showing the cost of construction of these lines with the committee.

The CHAIRMAN. That was a very expensive way of doing business.

Mr. MURRAY. To a certain extent it is unquestionably misleading. At the present time under the public utilities act no public-service corporation can issue securities unless the value is there, but in a proposition of this kind you must consider that it was an enterprise just starting, a pioneer. It is the beginning of something. Before this company started there were no large tubes in America. The millions of letters handled went by screen wagon. In the 1908 report of the Pneumatic Tube Commission they were estimated as 18,000,000

letters per day handled by the tubes. This company has constructed something, and it is on this that we have tried to justify our securities, and we feel that we are in a large measure successful.

The capital with which we began business in the year 1908 was \$876,671. In the year 1908 the interest was \$52,600; paid on bonds and stock, \$31,750, making the unpaid interest \$20,850; unpaid officers, \$12,000; alterations to Broad Street Station, \$1,000; and new construction, central post office, Southwark, D and central post office, Reading, \$170,000; making a total capital at the beginning of the year 1909 of \$1,080,521.

In the year 1909 the interest was \$64,831; paid on bonds and stock, \$41,851, making the unpaid interest \$22,980; unpaid officers, \$12,000; new construction, Fairhill and North Philadelphia, \$117,000; making a total of \$1,232,501.

In the year 1910 the interest was \$73,950; paid on bonds and stock, \$63,814, making the unpaid interest \$10,136; unpaid officers, \$12,000; alterations at Broad Street Station, \$3,770; making a total of \$1,258,407.

In the year 1911 the interest was \$75,504; paid on bonds and stock, \$63,814; making the unpaid interest \$11,690; unpaid officers, \$12,000; alterations at Fairmount Avenue, \$5,000; making a total of \$1,287,097.

In the year 1912 the interest was \$77,226; paid on bonds and stock, \$63,814; making the unpaid interest \$13,412; unpaid officers, \$12,000; making a total of \$1,312,509 as our capital placed absolutely in the business up to the beginning of the year 1913.

The CHAIRMAN. You say the officers were not paid that year?

Mr. MURRAY. The officers have never received any pay, excepting one.

The CHAIRMAN. That is the treasurer?

Mr. MURRAY. Yes; and the other officers receive no pay whatsoever.

The CHAIRMAN. What are the officers, a vice president and president?

Mr. MURRAY. The president and the secretary. The secretary has been associated with the company since 1892. The trials he suffered in endeavoring to find a market for the securities would stagger the imagination.

Mr. MURDOCK. The amount of your outstanding securities, then, is \$1,696,900?

Mr. MURRAY. Yes; \$1,696,900.

Mr. MURDOCK. And your present calculations, figured up as you have just shown us in the recitation of these values, is \$1,312,509? Is that correct?

Mr. MURRAY. Yes, sir; absolutely.

Mr. MURDOCK. But the difference between your paper value and what we may designate here as your actual value is \$447,000. Is that correct?

Mr. MURRAY. It is even more than that; some \$450,000.

Mr. MURDOCK. Is it fair then to say that your issue of \$500,000 was all water?

Mr. MURRAY. It would be very unfair to arrive at the conclusion that the \$500,000 was all water, because, as I have explained to you, the first \$300,000 out of that \$500,000 represented actual dollars used, and I have traced, or have endeavored to trace, the equities that we have placed in the property.

Mr. MURDOCK. If you can, I wish you would show me the fallacy of my statement that there is an actual difference between your paper value and your physical value as you have shown it here of nearly \$500,000. Why does it not follow that your \$500,000 of common stock issue was water?

Mr. MURRAY. That is an arbitrary conclusion, because you are taking the entire sum between the actual dollars that we have traced into the business and our total capitalization. Now, the question arises, Were there any values not included in this sum which I have just read to you?

Mr. MURDOCK. I thought you were pretty liberal with yourself there. It may be that you were not. I thought you had included in your statement that you gave us all the values that you claim for this property.

Mr. MURRAY. If you undertake to market a security—take to-day a public-service corporation. The courts set their faces like flint against confiscation of it. You can not confiscate a public-service corporation. It is impossible. While the actual, physical, tangible property of ours can not be confiscated, the fact remains that we have only one customer. It puts us in such a position that when we go to borrow money we are met with a statement like this: “Well, it is true your earnings are fairly representative, but where is the property?” Mr. Hayden, in his testimony before the commission, stated that in the days of the pioneers they were willing to take risks, but you can not ask the banker to-day to take risks. He wants to know first if the principal is absolutely secure, and then comes in a consideration of the return.

Mr. MURDOCK. Do you claim that the last figures given by you in your statement—\$1,312,509—is the value of your property now?

Mr. MURRAY. No; we do not. We consider that there are equities in addition to that that we have not enumerated here. The only equities that I have considered are the interest charges of the actual dollars that have entered into this, and \$12,000 a year for the officers. In other words, it shows what is known in the science of the present time as the intangible or invisible value—the value that is not in the physical property. When a company goes into the hands of a receiver and a reorganization is effected and the reorganization committee applied to the public-service commission of a State like New York for approval of its securities, the question comes up before the commission as to what amount shall be approved and whether or not some one shall be sent over that physical property to lay a hand on every dollar that has gone into it or whether the physical property shall be taken at a certain valuation and an allowance made for what is called the intangible value, the value represented by franchises. Although they may not give us a cent, they have a value, because they are absolutely necessary to operate, whatever the public utility may be. It is true that in the early construction of the property the securities may have been issued in a way which would not be justified to-day, but they have been issued to secure the necessary legal property of the corporation.

Mr. MURDOCK. What do you give in the way of the items like good will and other intangible matters to make up the difference spoken of here?

Mr. MURRAY. We have endeavored to do everything in our power to gain the good will of our only customer. It is very difficult to undertake to charge that customer for the good will, but there are several things that have entered into it which I have not taken into consideration. For instance, the directors' time and the expense and trouble they have been put to in the 20 years. The equities that enter into our property are in addition to those I have enumerated, such as preliminary expenses of incorporation, the expense of maintaining an office and one thing and another.

Mr. MURDOCK. You have paid for that out of the running expenses, have you not?

Mr. MURRAY. We have charged that to operation where it was permissible, but there are certain things you could not charge in that way.

The CHAIRMAN. You have not made any proposition to the Government, have you, for a sale?

Mr. MURRAY. The only proposition that I am aware of is that in 1908 we suggested to the Government \$1,390,000 as a selling price.

I should like to read to the commission a portion of a decision of the Court of Appeals of the State of New York regarding the reasonable profit of promoting the Third Avenue reorganization, Floy—estimating the profits at from 5 to 10 per cent. In dealing with public-service corporations and reorganizations the courts have always recognized that when investments have been made in good faith for the purpose of serving public convenience and supplying public facilities the investor should be accorded liberal treatment, protection against confiscation, and an opportunity to recognize the truth, elsewhere so often disregarded, that if private investors had not furnished the capital for railroads and other utilities and conveniences the funds would have had to be raised by taxation, frequently at times when and in communities where the burden could not have been conveniently borne.

Here is an enterprise existing to-day which the Government would never in all Christendom have undertaken to originate. It remained for private enterprise to originate it; men who are willing to take a risk; men with business sagacity who were not afraid to invest money provided there was going to be a return upon it.

The difference between a live plant and a dead one is real value and is independent of any franchise to go on or any mere good will as between such plant and its customers. * * * That there is a difference between even the cost of duplication, less depreciation, of the elements making up the plant and the commercial value of the business as a going concern is evident.

The street-car system may have laid its rail and built its power plant and have bought its cars, but it does not have the value that it afterwards will have when its business has been adjusted and the people have adjusted their business and their conveniences to work in harmony with the system thus established. It is not material whether we call it good will or the value of a going concern, but there is the intangible value there, and the owner has the right to have it determined on such increased valuation.

The existing evil that designing individuals had frequently procured as a free gift or for a merely nominal payment, a valuable public franchise, and had immediately sold such franchise to a public-service corporation, organized by themselves for the purpose of taking it over, for a large sum in stock or bonds of the corporation, representing an inflated valuation of the franchise as such.

The franchises of such a corporation constitute necessarily an element of the value of every article of the property, suitable for its corporate purposes, which the corporation possesses; they are inseparable from the use of the corporeal property, and it is impossible fairly to value such a property as a going concern without considering franchises which make its use possible or profitable. The connection or association is practically indissoluble. Of course, apart from the franchises, the value of the tangible property is vastly less than the cost, for without the franchises to operate the property would be a nuisance and practically valueless.

The CHAIRMAN. The owners of the companies would not object, would they, if this commission had an engineer and an auditor appointed to make an investigation?

Mr. MURRAY. We certainly would consider it and let you know our decision.

The CHAIRMAN. Would you extend every opportunity to them?

Mr. MURRAY. Every possible courtesy. We desire to have the commission come to Philadelphia. We will endeavor to demonstrate to the commission that the capacity of a pneumatic tube is in excess of 28,000 for the period of 20 hours. We will extend every courtesy in the way of giving access to our papers, documents, etc.

Mr. MURDOCK. It seems that your paper value is some \$500,000 more than the figures you gave here this afternoon. The difference of \$500,000 is, as I understand it, made up by the possession of the company of certain intangible elements of property, such as good will and franchises, unpaid salaries to directors, office rent, etc. Can you state any other items?

Mr. MURRAY. Also patent charges. For instance, there were issued \$200,000 in connection with the acquisition of the patents.

Mr. MURDOCK. I think that it is legitimate to include that in the list.

The CHAIRMAN. Was that \$200,000 issued in stock?

Mr. MURRAY. Yes, sir; it was part of the original common stock.

Mr. STEWART. And that amount is not included in the amounts you read here item by item?

Mr. MURRAY. No; that is not included in the cost of the physical, tangible property which I have enumerated. As I mentioned in my earlier testimony, we have undertaken the acquisition of the electric-tunnel patent by an issue of \$100,000 of preferred stock.

The CHAIRMAN. Am I correct in my understanding that your stockholders desire the Federal Government to purchase your company?

Mr. MURRAY. We would certainly desire very much to arrive at proper terms with the Federal Government. We, however, would be perfectly willing to accept a 50-year contract, or we would be willing to accept a higher rental, which would allow of an amortization of the principal sum.

The CHAIRMAN. If the question of sale were being considered, on what basis would you enter into it?

Mr. MURRAY. The proposition which has been before the commission—I do not recall now just who suggested it—of 6 per cent on the earning capacity. That would, in my judgment, be fair, but I am only speaking for myself. Such a proposition would have to go before the board of directors and stockholders. Then there has been another proposition mentioned, that in connection with the rule of the Interstate Commerce Commission—that is, the original cost of construction, the going concern, the reproduction value. I think that would work out in our plant in such a way that it would be almost equal to the 6 per cent on the earning capacity.

Mr. STEWART. In speaking of the price, does that include a transfer to the Government of your rights under these patents for the electric tunnel that you spoke of?

Mr. MURRAY. Yes; we would include the electric-tunnel rights in the price. Of course, as I say, the price proposed to the commission

seems to me to be a fair one. I can not, however, give a positive expression on that point at this time.

Mr. STEWART. What is that price? You have not stated definitely.

Mr. MURRAY. Our earnings being \$85,000; capitalized at 6 per cent would run in the neighborhood of \$1,416,666, and I think our earnings are in excess of that at the present time. We are doing better now, and we would expect such a price as would enable us to retire our outstanding securities at par at least.

Mr. STEWART. But there is no item here in these expenses for interest on bonds and payments on your preferred stock.

Mr. MURRAY. No.

Mr. STEWART. Should they not be included there? The point that I want to bring out is with reference to your statement of the profits upon which it is suggested to calculate an interest of 6 per cent. Those profits are given here as \$84,000, but the items of expenses do not seem to include any items of interest on the bonds.

Mr. MURRAY. Here you will notice are the bonds, with the interest deducted [referring to the tabulated statement].

The CHAIRMAN. The \$85,000 does not include the salaries?

Mr. MURRAY. No, sir.

Mr. MURDOCK. You allow in your statement 6 per cent on the \$42,000. That is correct, is it not?

Mr. MURRAY. That is correct.

Mr. MURDOCK. Would not 6 per cent a year on \$42,000 for 20 years compounded amortize the \$42,000, and more?

Mr. MURRAY. You take \$42,000 put into the concern 20 years ago, it is entitled to a return therefrom of 6 per cent.

Mr. MURDOCK. Yes; but in your interest charge there you compound.

Mr. MURRAY. The investor has never gotten anything back on it.

Mr. MURDOCK. But in your computation there in 20 years you compound that 6 per cent on your \$42,000.

Mr. MURRAY. The investor receiving no return, I think we are perfectly justified.

Mr. MURDOCK. We are figuring on the basis that we are going to buy the line from you. One of the processes by which you arrive at the value is that we shall amortize that value. Have we not done more than that in the way you figure your interest?

Mr. MURRAY. Do you think it is fair, Mr. Murdock, to isolate that one line?

Mr. MURDOCK. But I was merely trying to arrive at the methods by which you build your table.

Mr. MURRAY. The method that we proceeded on is this: The actual money put into the business, interest thereon, salaries that have been unpaid, aggregating an equity, and that added each year as there was no return on it; and then adding the loss in operation. The court of appeals in the Third Avenue reorganization did not take into consideration the reproductive value alone, because the physical reproductive value of a plant is not the mere item to be considered. The going concern must be taken into consideration. You must take into consideration that any concern to reproduce that must meet the charges which all companies have had to meet.

The CHAIRMAN. It is not only the question of what the property can be reproduced for, but it is also a matter of the franchises and all items.

Mr. MURRAY. We candidly admit that the approximate cost of construction to-day is in the neighborhood of \$80,000 per mile.

The CHAIRMAN. And you have 10 miles; that is \$800,000.

Mr. MURRAY. \$800,000; yes.

Mr. STEWART. You spoke awhile ago of quoting a price in 1908 of \$1,390,000, but at that time the entire line was not constructed, Mr. Murray.

Mr. MURRAY. No; there has been since constructed the Reading, the Fairhill, and North Philadelphia lines.

Mr. STEWART. I thought that point ought to be cleared upon the record, because somebody asked you for a price, and you named that as the price which you would give.

The CHAIRMAN. I do not think these gentlemen are now coming to us with any figures at all as to what they want to sell to the Government for. They are appearing here and present the whole proposition for us to investigate. I do not think anyone who has appeared here previous to this has made any clearer statements than Mr. Murray.

The tabulated statements discussed by Mr. Murray are as follows:

Statement showing money invested year by year in the Philadelphia pneumatic-tube system, including construction costs, unpaid interest, operating losses, station alterations, etc.

Year 1892:

New construction (line central post office to Bourse) -----	\$42,000
---	----------

Year 1893:

Unpaid interest -----	2,520
Unpaid officers -----	12,000
Loss in operation (estimated) -----	12,000

Total -----	68,520
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Year 1894:

Unpaid interest -----	4,111
Unpaid officers -----	12,000
Alterations (estimated) -----	10,000
Loss in operation -----	8,000

Total -----	102,631
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Year 1895:

Unpaid interest -----	6,158
Unpaid officers -----	12,000
Loss in operation (estimated) -----	8,500

Total -----	129,289
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Year 1896:

Unpaid interest -----	7,757
Unpaid officers -----	12,000
Loss in operation -----	8,500

Total -----	157,546
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Year 1897:

Unpaid interest	\$9,453
Unpaid officers	12,000
Loss in operation	8,500
Total	<u>187,499</u>

Year 1898:

Unpaid interest	11,250
New construction (line central post office to Broad Street Station)	60,000
Unpaid officers	10,000
Loss in operation	5,000
Total	<u>273,749</u>

Year 1899:

Interest	\$16,425
Paid on bonds	10,000
Unpaid interest	6,425
Unpaid officers	12,000
Loss in operation	5,000
Total	<u>297,174</u>

Year 1900:

Interest	\$17,830
Paid on bonds	10,000
Unpaid interest	7,830
Unpaid officers	12,000
Loss in operation	5,000
Total	<u>322,004</u>

Year 1901:

Interest	\$19,320
Paid on bonds	10,000
Unpaid interest	9,320
Unpaid officers	12,000
Loss in operation	5,000
Total	<u>348,324</u>

Year 1902:

Unpaid interest (tubes shut down)	20,899
Unpaid officers	12,000
Total	<u>381,223</u>

Year 1903:

Interest	\$22,873
Paid on bonds	10,000
Unpaid interest	12,873
Unpaid officers	12,000
Loss in operation	5,000
Total	<u>411,096</u>

Year 1904:

Interest	\$24,666
Paid on bonds	10,000
Unpaid interest	14,666
Unpaid officers	12,000

Year 1904—Continued:

Loss in operation-----	\$5,000
Alterations at Broad Street Station-----	2,000
Total-----	<u>444,762</u>

Year 1905:

Interest-----	\$26,686
Paid on bonds-----	10,000
Unpaid interest-----	16,686
Unpaid officers-----	12,000
New construction (central post office, S-O)-----	175,700
Loss in operation-----	5,000
Total-----	<u>654,148</u>

Year 1906:

Interest-----	\$39,249
Paid on bonds and stocks-----	18,000
Unpaid interest-----	21,249
Unpaid officers-----	12,000
Total-----	<u>687,397</u>

Year 1907:

Interest-----	\$41,244
Paid on bonds and stock-----	18,000
Unpaid interest-----	23,244
Unpaid officers-----	12,000
New construction (Broad Street, J-C)-----	154,030
Total-----	<u>876,671</u>

Year 1908:

Interest-----	\$52,600
Paid on bonds and stock-----	31,750
Unpaid interest-----	20,850
Unpaid officers-----	12,000
Alterations (Broad Street Station)-----	1,000
New construction (Central post office, Southwark, D, central post office, Reading)-----	170,000
Total-----	<u>1,080,521</u>

Year 1909:

Interest-----	\$64,831
Paid on bonds and stock-----	41,851
Unpaid interest-----	22,980
Unpaid officers-----	12,000
New construction (O, Fairhill, North Philadelphia)-----	117,000
Total-----	<u>1,232,501</u>

Year 1910:

Interest-----	\$73,950
Paid on bonds and stock-----	63,814
Unpaid interest-----	10,136
Unpaid officers-----	12,000
Alterations (Broad Street)-----	3,770
Total-----	<u>1,258,407</u>

Year 1911:

Interest	\$75, 504	
Paid on bonds and stock	63, 814	
Unpaid interest		\$11, 690
Unpaid officers		12, 000
Alterations (Fairmount Avenue)		5, 000
		<u>1, 287, 097</u>

Year 1912:

Interest	\$77, 226	
Paid on bonds and stock	63, 814	
Unpaid interest		13, 412
Unpaid officers		12, 000
		<u>1, 312, 509</u>

Pneumatic Transit Co. balance sheet, March 31, 1912.

ASSETS.

Cash in bank and on hand		\$3, 044. 26
Accounts receivable:		
United States Post Office Department, March rental	\$14, 166. 52	
International Pneumatic Tubs Co.	7, 764. 25	
Batcheller Pneumatic Tube Co.	15, 628. 27	
Miscellaneous	590. 98	
		<u>38, 150. 02</u>
		41, 194. 28
M. B. Rizzo (old balance originating prior to June, 1908)		14, 433. 27
Plant, equipment, etc.:		
Tube system—		
6 miles in Philadelphia	860, 000. 00	
Southwark and Station D	235, 000. 00	
Reading Terminal	20, 000. 00	
Fairhill and North Philadelphia	199, 750. 00	
Fairmount Avenue Station, reconstruction	4, 880. 35	
	<u>1, 319, 630. 35</u>	
Tools and shop equipment	3, 411. 70	
Furniture and fixtures	3, 194. 28	
New carriers	14, 933. 65	
Line equipment	750. 96	
Power regulators	4, 983. 15	
	<u>1, 346, 904. 09</u>	
Patent rights	200, 000. 00	
Exploitation account, representing operating losses and demonstrating expenses up to Jan. 1, 1908 ..	62, 515. 80	
		<u>1, 609, 419. 89</u>
		<u>1, 665, 047. 44</u>

LIABILITIES.

Accounts payable:		
Philadelphia Electric Co	\$13, 728. 72	
Pennsylvania States taxes for 1907, 1908, 1909, 1910, and 1911	3, 537. 40	
New Jersey State tax, 1911	1, 396. 90	
Frank Rittenhouse	1, 497. 36	
Other accounts	1, 921. 16	
		<u>\$22, 081. 54</u>

Accrued accounts:

Bond interest-----	\$2, 500. 00	
Taxes due and accrued-----	1, 338. 62	
		<u>\$3, 838. 62</u>

First-mortgage bonds, 5 per cent-----	25, 920. 16	
Reserve for depreciation-----	200, 000. 00	
	16, 740. 62	
		<u>242, 660. 78</u>

Capital and surplus:

Capital stock—

Preferred stock authorized--	\$1, 000, 000. 00	
Less in treasury-----	103, 100. 00	
		<u>896, 900. 00</u>

Common stock authorized --	500, 000. 00	
Less in treasury-----	760. 00	
		<u>499, 240. 00</u>

	1, 396, 140. 00	
Surplus as annexed-----	26, 246. 66	
		<u>1, 422, 386. 66</u>
		<u>1, 665, 047. 44</u>

Surplus account March 31, 1912.

Apr. 1, 1911, balance per last annual report-----	\$22, 824. 24	
Less:		
Adjustments of dividend Jan. 25, 1908---	\$100. 00	
Reserve for depreciation for periods prior to Mar. 31, 1911-----	12, 078. 12	
	<u>12, 178. 12</u>	
		<u>\$10, 646. 12</u>
Profits for year ended Mar. 31, 1912, as annexed-----	69, 414. 54	
		<u>80, 060. 66</u>
Dividends on preferred stock:		
3 per cent on \$896,900, July, 1911-----	26, 907. 00	
3 per cent on \$896,900, Jan., 1912-----	26, 907. 00	
	<u>53, 814. 00</u>	
Mar. 31, 1912, balance-----	26, 246. 66	

Statement of profit and loss account for the fiscal year ended Mar. 31, 1912.

EARNINGS.

Rentals from United States Post Office Department-----	\$169, 998. 29	
Sales of scrap-----	108. 17	
		<u>170, 106. 46</u>

EXPENSES.

Operating:

Electric power for operating tubes----	\$43, 507. 43	
Station labor-----	26, 386. 38	
Wagon service-----	169. 50	
Linemen's expenses-----	380. 73	
	<u>\$70, 444. 04</u>	

Maintenance:

Electric power for repair shop-----	131. 77	
Repair shop labor-----	933. 60	
Machinery repairs-----	2, 615. 07	
Line repairs-----	881. 44	
Supplies (oil, waste, etc.)-----	638. 16	
Freight and hauling-----	264. 66	
	<u>5, 464. 70</u>	

General:

Salaries, administration-----	\$3, 058. 63	
Rent of office and repair shop-----	1, 682. 64	
Telephones -----	636. 49	
Stationery and postage-----	89. 80	
Office expense -----	164. 36	
General expense -----	482. 13	
Legal and municipal expense -----	707. 04	
Entertainment -----	139. 75	
Insurance -----	106. 66	
Taxes -----	2, 754. 21	
	<hr/>	\$9, 821. 71
		<hr/> \$85, 730. 45

Profit on operating ----- 84, 376. 01

Less:

Interest on funded debt -----	10, 000. 00	
Interest on floating debt-----	298. 97	
	<hr/>	10, 298. 97
Reserve for depreciation -----		4, 662. 50
		<hr/> 14, 961. 47

Net profit, carried to surplus account----- 69, 414. 54

The cost of construction and installation at the present time would be about the same rate per mile as the construction of our lines from Broad Street Station to Stations J and C, 2.1215 miles in length, constructed in 1907, and is as follows:

Station C.

MATERIALS.

Air-piping gauges and gauge piping-----	\$863. 00
Conduits overhead, all cabels from service switch to motors, electric-light conduits, wiring gauge board, etc-----	183. 00
Support for auto starters-----	7. 05
Trench frames-----	18. 70
Trench plates-----	43. 80
Screw casting-----	40. 00
Metal ceiling -----	139. 50
Oil can and filter-----	37. 00
Special flanged pieces:	
One 5 feet 8½ inches long; one 10 feet 2½ inches long-----	64. 63
Oil drips, 2, at \$4-----	8. 00
Old boiler tubes for foundation bolts, 1½ cents per pound-----	10. 00
Extra charge for 4-pole breakers instead of 2-pole:	
One 100 amperes-----	45. 00
One 50 amperes-----	25. 00
Stirrups, etc., for supporting tubes-----	12. 10
	<hr/> 1, 612. 45

Station J.

MATERIALS.

Trench frames-----	\$65. 70
Trench frames-----	31. 25
Extra charge for 4-pole breakers instead of 2-pole:	
Two 100 amperes, at \$45-----	90. 00
One 50 amperes. at \$25-----	25. 00
Building foundations and pipe trenches, restoring floor, facing walls with lath and plaster, cutting 1 door, building wall across one end room, cutting window and building light wall to it in adjoining basement, cementing entire basement, cost, plus 10 per cent (contract) -----	3, 601. 37
Pipe supports under tubes-----	13. 95
Extra piping for temporary connection to Broad Street and return---	101. 97

Pipe supports under air piping-----	\$51. 75
Metal ceiling-----	134. 00
Oil cans and filters-----	37. 00
Special flanged pieces-----	103. 40
Old boiler tubes for foundation bolts-----	15. 00
2 pieces 6-inch I beam (9 feet) for door and window-----	6. 10
Total for materials-----	4, 276. 49

Broad Street Station.

MATERIALS.

Air piping gauges and gauge piping-----	\$863. 00
Conduits, overhead; all cable, from a service switch to motors, electric-light conduits and wiring, gauge board, etc-----	183. 00
Support for auto starters-----	7. 05
Trench frames-----	18. 70
Trench plates-----	43. 80
Screw casting-----	40. 00
Metal ceiling-----	139. 50
Oil can and filter-----	37. 00
Special flanged pieces:	
One 5 feet 8½ inches long-----	64. 63
One 10 feet 2½ inches long-----	115. 67
Oil drips, 2, at \$4-----	8. 00
Old boiler tubes for foundation bolts. 1½ cents per pound-----	10. 00
Extra charge for 4-pole breakers instead of 2-pole:	
One 100 amperes-----	45. 00
Two 50 amperes-----	25. 00
Stirrups, etc., for supporting tubes-----	12. 10
Total for materials-----	1, 612. 45

STREET MATERIALS.

Tubing, 21,862.6 feet, at \$1.33-----	\$29, 514. 51
(Short lengths made from defectibe pieces same price per foot.)	
Bends:	
90°, 22 at \$191-----	4, 202. 00
45°, 20 at \$105-----	2, 100. 00
Reducers, 73 at \$15-----	1, 095. 00
Drip lengths, 1,300, 720 pounds, at 10 cents-----	936. 00
Manhole covers, 41, at \$10-----	410. 00
Rails for manhole tops, \$12.50 per manhole-----	512. 50
Channels for carrying tubes and conduits across sewers-----	12. 52
Rubber rings for bends, 100, at \$1.40 per pound-----	15. 28
Step irons for manholes, 4 per manhole, 10 cents each-----	16. 40
½ bolts for bends, 800, at \$2.50 per hundred-----	20. 00
3-inch iron conduit over subway, Arch Street and Sixteenth and Cuthbert, 1,087 feet 6 inches, with couplings, etc., cut and threaded---	304. 54
Special castings for joining iron and terra-cotta conduit-----	3. 00
Sleeves for covering leaking bells, 2½ sets, at \$8 (estimated)-----	20. 00
Sleeves for covering leaking tubes-----	4. 31
Hangers for tube over subway-----	4. 85
Nails used at Stations J and C-----	2. 29
Total for street materials-----	39, 173. 20

Station C.

MACHINERY.

Transmitter, 1-----	\$531. 00
Receiver, 1 lower deck-----	686. 00
Compressors:	
One at \$3,500-----	3, 500. 00
One at \$3,800-----	3, 800. 00

Motors:

One 50-horsepower	\$719. 00
One 21.6-horsepower	521. 00
Oil separators, 1	61. 50
Pneumatic circuit breakers, 2, at \$28	56. 00
Alarm whistle	5. 35
Voltmeter and swinging arm	42. 00
Chain guards, 2 at \$45.50	91. 00
Counter for transmitter	10. 50
Stopper for transmitter	1. 00
Handling mechanism for regulating valves	78. 00
Total for machinery	10, 101. 35

Station J.

MACHINERY.

Transmitters, 2 at \$531	\$1, 062. 00
Receivers:	
One upper deck	686. 00
One lower deck	686. 00
(Including gate valves, castings, and regulating valves.)	
Compressors:	
Two at \$3,500	7, 000. 00
One at \$3,800	3, 800. 00
Motors:	
150-horsepower	719. 00
130.2-horsepower	601. 00
121.6-horsepower	521. 00
(Motors, two-phase, 7,200 alternating, 220 volts, 690 r. p. m. Price includes auto starters and panels, each provided with ammeters and circuit breaker; also delivery and erection. Meter panel, 2 intergrating wattmeters, 4-pole switch and fuse blocks, furnished by the Philadelphia Electric Co. Trans- formers and inclosures furnished without charge by Philadel- phia Electric Co.)	
Air piping, including gauges and gauge connections	1, 387. 00
Electric conduits overhead from transformers (service switch) to meter panel, thence to switchboard; also cables service switch to motors; also electric lights and gauge board	272. 00
Electric conduits underground auto starter to motors	49. 50
Support for auto starters	10. 16
Oil separators, 2 at \$61.50	123. 00
Screen castings, 2 at \$40	80. 00
Pneumatic circuit breakers, 3 at \$28	84. 00
Alarm whistles, 3 at \$4.35	13. 05
Voltmeter and swinging arm	42. 00
Chain guards, 3 at \$47	141. 00
Handling mechanism for regulating valves	107. 00
Oil drips, 3 at \$4	12. 00
Counters for transmitters, 2 at \$10.50	21. 00
Stoppers for transmitters, 2 at \$1	2. 00
	17, 418. 71

Broad Street Station.

MACHINERY.

Transmitters, 1	\$531. 00
Receiver, 1 lower deck	686. 00
Compressors:	
One, at \$3,500	3, 500. 00
One, at \$3,800	3, 800. 00
Motors:	
One 50-horsepower	719. 00
One 21.6-horsepower	521. 00

Oil separator -----	\$61.50
Pneumatic circuit breaker, 2 at \$28-----	56.00
Alarm whistle-----	4.35
Voltmeter and swinging arm-----	42.00
Chain guards, 2 at \$45-----	91.00
Counter for transmitter-----	10.50
Stopper for transmitter-----	1.00
Handling mechanism for regulating valves-----	78.00
Total for machinery-----	10,101.35

Station C.

LABOR.

Building foundations and pipe trenches, restoring floor, facing walls with lath and plaster, building partition across one side of room, cost, plus 10 per cent (contract work)-----	\$1,565.45
Painting -----	183.00
Erecting terminals-----	40.00
	1,788.45

Station J.

LABOR.

Moving gas pipes and fixtures, heater sink, wire partitions in post-office building; also connecting drains from areaway to sewer-----	\$329.88
Painting terminals, compressors, piping walls, ceiling, foundation, etc -----	147.00
Erecting terminals-----	65.00
	541.88

Broad Street Station.

LABOR.

Building foundations and pipe trenches, restoring floor, facing walls with lath and plaster, building partition across one side of room, cost, plus 10 per cent (contract work)-----	\$1,565.45
Painting -----	183.00
Erecting terminals-----	40.00
	1,788.45

Excavation:

Earth 8,383.34 cubic yards, at \$2.95, contract work-----	24,730.86
Rock 47.48 cubic yards, at \$3.25, contract work-----	154.31
(Excavation includes cutting pavement, storing earth if necessary, backfilling, carting away surplus and temporary repairing. Trench figured 32 inches wide or 36 inches if depth exceeds 6 feet conduit trench 13 inches wide.)	
Laying tubing, 22,822.06 feet, at 30 cents. contract work-----	6,846.78
(Bends and drips counted double length.)	
4-duct conduit furnished and laid 10,644.09 feet, at 40 cents, contract work (with 3-inch concrete on every side)-----	4,256.83
Brickwork in manholes, 118,741, at \$2.50 per thousand, contract work (number of manholes, 41)-----	2,643.40
Openings in foundation walls, 166.91 cubic feet, at \$1-----	166.91
Concrete for bottoms of manholes, 28.703 cubic yards, at \$7.50, contract work -----	215.28
Extras-moving drains, fluming and cradling sewers, altering sewer inlets, cutting and restoring manholes of other companies-----	1,914.08
Extra support under tube where needed, contract work-----	700.00
(This work done at cost plus 10 per cent.)	

Gas companies bills for moving mains and services-----	\$268. 90
(Principally to get them out of our manholes.)-----	
Water bureau bills for moving mains and services-----	189. 01
Repaving sidewalks where tube is underneath-----	337. 96
Also across floor of baggage-room B. S. S., contract work (cost plus 10 per cent)-----	722. 15
Cement paving in baggage room, contract work (cost plus 10 per cent) -----	722. 13
Cuttings special lengths, 9 at \$2.50 (others were made up without cutting by using short lengths)-----	22. 50
Cutting 10-inch holes in girders over subway-----	115. 00
Drilling holes for hangers over subway-----	14. 00
Lagging tubes over subway to prevent freezing (Ehret Magnesia Co., 80 feet at \$2, use of scaffolding \$15)-----	363. 12
Cutting 3-inch holes through plates at subway for conduits-----	44. 27
Plumbers bills not included in extras above of removing drains, etc-----	15. 98
Repairing by city contractors on streets, railroad streets:	
3,021.35 square yards of asphalt, \$1.85-----	5, 589. 49
646.06 square yards of granite blocks, at 22 cents-----	148. 45
405.96 square yards of granite blocks, at 36.3 cents-----	148. 36
40.10 feet of crossing reset, at 19 cents-----	7. 62
Plus 5 per cent on above items to city for inspectors-----	294. 38
Repairing by private contract, contractors to guarantee:	
80 square yards asphalt, Oxford Street, at \$1.85-----	168. 00
170 square yards asphalt, North Street, at \$2.43-----	413. 10
730.78 square yards asphalt, Cuthbert Street, \$2.43-----	1, 745. 49
Total of street work-----	52. 952. 46

SUPERVISION.

Inspectors-----	\$1, 075. 00
Draftsmen (9 months)-----	900. 00
Drafting materials (estimated)-----	100. 00
City plans 2,118 minimum-----	382. 58
Blue prints (total 2,327 for this line, estimated)-----	20. 00

OFFICE AND INCIDENTALS.

Secretary's time-----	\$300. 00
Stenographer (half of his time)-----	260. 00
Chief Engineer-----	4, 050. 00
Telephone (one-third of rent for one year)-----	62. 33
Office rent (one-third of rent engineering office one year)-----	333. 33
Third and Chestnut Street office, \$117 per month-----	468. 00
	7, 951. 24

GENERAL CHARGES.

Freight on tubes from Camden, N. J., to Philadelphia (shown by re- ceipts \$33.79, balance estimated \$98.59)-----	\$432. 38
Cartage of machinery-----	52. 11
Freight on transmitters, etc., from Norristown-----	10. 21
Carriers, 50 at \$20-----	1, 000. 00
Mandrils, 4 at \$10-----	40. 00
Expansion plugs, 4 at \$25-----	100. 00
Pattern for screen casting-----	10. 00
Mr. B.'s expenses to Pittsburgh testing motors-----	29. 39
R. D. Wood blocking four cars to hold pipes in place-----	25. 00
Black protective paint for tubes and conduits over subway-----	2. 45
Testing concrete made with sand taken from trench-----	8. 00
Iron cement-----	1. 50
Restoring sheathing under side of bridge at subway-----	300. 00
	2, 011. 04

*Summary of construction of Broad Street station, stations J and C lines,
2.12 miles in length.*

Materials:

Station C-----	\$1, 612. 45	
Broad Street station-----	1, 612. 45	
Station J-----	4, 276. 49	
Street materials-----	39, 173. 20	
		<hr/> \$46, 674. 59

Machinery:

Station C-----	10, 101. 35	
Broad Street station-----	10, 101. 35	
Station J-----	17, 418. 71	
		<hr/> 37, 621. 41

Labor:

Station C-----	1, 788. 45	
Station J-----	541. 88	
Broad Street station-----	1, 788. 45	
Street labor-----	52, 952. 46	
		<hr/> 57, 071. 24

Supervision-----	7, 951. 24	
General charges-----	2, 011. 04	
		<hr/> 151, 329. 52

Plus 10 per cent to contractor----- 15, 132. 95

Total cost of construction----- 166, 462. 47

STATEMENT OF MR. KENNETH E. STUART.

Mr. K. E. STUART. There are just two or three points that I have noted down as Mr. Murray was speaking that I think have not been left in a very clear position. Mr. Murdock asked whether a payment of 6 per cent per year would not have amortized the sum of \$42,000 in 20 years. The answer is in the negative. To amortize a sum you must put aside each year a sinking fund which is maintained at interest, and, in addition to that sinking fund, you must pay the interest on the original capital. This 6 per cent is merely paying the interest on the original capital. It is not in any sense a sinking fund.

Mr. MURDOCK. Did you compound that for 20 years? Did you do that before making the statement that you have just made?

Mr. K. E. STUART. In the statement that Mr. Murray has just read the interest was compounded.

Mr. MURDOCK. But in the statement which you have just made. You said you thought the reply would be in the negative. Can you say that positively?

Mr. K. E. STUART. I say positively that it is in the negative.

Mr. MURDOCK. What does the interest on \$42,000 at 6 per cent compounded for 20 years amount to? Did you make that calculation?

Mr. K. E. STUART. No; we have not made that calculation.

Mr. MURDOCK. The simple interest, of course, is \$50,000.

Mr. K. E. STUART. It seems to me that that is beside the point. What you asked was whether or not the payment of 6 per cent compounded would amortize the principal. My reply is that it could not constitute an amortization because it is not a sinking fund, and a sinking fund would necessarily be an addition to that payment. Is that clear?

Mr. MURDOCK. No; it is not.

Mr. K. E. STUART. I have figured the prices on the amortization basis a great many times in connection with our tenders, and the way we do it is to calculate the amount of the sinking fund first of all.

Mr. MURDOCK. How do you arrive at your sinking fund with that process? What per cent do you take for a sinking fund?

Mr. K. E. STUART. The sinking fund is the sum which when set aside each year and kept at interest will amount to the original principal at the end of the given term.

Mr. MURDOCK. What term do you fix upon?

Mr. K. E. STUART. The term is purely optional.

Mr. MURDOCK. That determines your percentage?

Mr. K. E. STUART. That determines the amount of the sinking fund. In addition to the sinking fund, of course, the interest must be paid on the principal each year. That must be added to the sinking fund. In this case, as you will see, the interest has not been paid. Therefore, it is only fair that it should be compounded. The unpaid interest is really an additional investment for the ensuing year.

Mr. MURDOCK. Then, if this company in the beginning had had sufficient to put aside a surplus, it would not in the course of years have compounded this charge?

Mr. K. E. STUART. Quite so.

Mr. MURDOCK. But, inasmuch as they did do it, it is now compounded, in the absence of the surplus sum.

Mr. K. E. STUART. Quite so. If that interest had been paid each year, we would not have suggested that it be compounded.

Mr. MURDOCK. Where does the earnings from the sinking fund go?

Mr. K. E. STUART. They are credited toward the amortization of the principal. That is the usual method. That is done every day.

The second point is with regard to the cost of the patents. Mr. Murray has given you the cost of the patents originally as \$200,000 in common stock of the company. My knowledge of the company goes back some years prior. I think he has overlooked the fact that during all those years we had to maintain a force of draftsmen continually at work on the improvement of the system, and that force of draftsmen was charged under our system of bookkeeping to another account. Consequently, it does not appear in any of these statements. It constitutes a very considerable addition to the sum that has been invested. I am not, however, prepared to give you figures as to that, because I did not anticipate that the point was going to be raised here.

The third point is with regard to the loss in operation, amounting to \$12,000 the first year. You will remember that in the first year there were no payments to the company whatever by the Government.

Mr. MURDOCK. Mr. Stewart wanted to know just exactly how you arrived at that \$12,000.

Mr. K. E. STUART. The entire cost of the operation of that line for the first year would be lost, because there was no payment from the Government. That \$12,000 is a figure that was given to me in the early years by persons whose recollection went back beyond mine. I was not connected with the company at that time, but I was told that the operation cost \$12,000. In the subsequent years we have credited against that the sums actually paid by the Government.

Another point is with regard to the Bourse line. I do not think it was brought out that the terminal apparatus of the Bourse line has been completely modified within the past two or three years, and the capacity of the Bourse line has been greatly increased thereby.

The next point is in regard to the alleged extravagance of constructing a tube line to connect stations where the volume of mail is only sufficient to utilize a small percentage of its capacity. I think the justification of a tube should not be found in the percentage of its capacity utilized, but rather in the cost per piece of mail expedited, and that has been worked out by the last commission as about half a mill per letter. Few people would object to paying half a mill more to have their letter go by an earlier train. So I think that even under those extreme circumstances it can hardly be alleged that the tube line is extravagant.

Mr. MURDOCK. However, that is the general average.

Mr. K. E. STUART. I think somewhere in that commission's report the extreme case is considered, the extreme case of a line that is used to the minimum of its capacity.

Mr. MURDOCK. And it was about half a mill per piece?

Mr. K. E. STUART. The cost in an extreme case has been given in that report, on page 44, as half a mill per letter per mile.

I want to say a few words in regard to the general utility of pneumatic tubes in the postal service. Questions have been asked which indicate that it is the impression of some members of the commission that in cases where the volume of mail exceeds the capacity of the tube there is no expedition; no gain. But I think Mr. Masten has given you a very good illustration of the manner in which certain mail is expedited in New York to the extent of catching a train that results in its gaining 24 hours. I think the impression has been left, however, that that is an exceptional case. As a matter of fact, the high speed of the tubes permits the dispatch of the mails to be continued for a certain interval after the wagon has left, and the amount of that interval depends, of course, upon the length of the line, but during that time the postal clerks are at work sorting the mail. They can sort something like 30 pieces of mail per minute each. If you have 25 clerks there, you would have 750 pieces of mail per minute additional sorted for each minute of that extra time. That results in the dispatch of several thousand letters on each train that would otherwise have missed that train. In Philadelphia there are several trains upon which fully 5,000 letters are dispatched that would otherwise have missed those trains. I think that on every dispatch of the day there are certain gains in that way. That is a gain that is not exceptional, but quite general.

Then, in regard to the mail that arrives at railway stations for transmission to the post office; the impression seems to be general that if the last carrier full arrives after the wagon there has been no gain in time. As a matter of fact, the pneumatic tube can supply 50 sorting clerks and keep them busy with mail to be sorted. Consequently, if there are no more than 50 clerks engaged in sorting a particular mail there would be no advantage in bringing it faster than the tube could bring it. If it were brought all at once and dumped on the floor, it could be sorted no more rapidly.

Mr. MURDOCK. That is an important statement, because it is generally believed that in the case of a large cargo of mail that the latter part of the bulky mail reaches the post office just as soon as the last part of the same bulk would reach it through a tube. You say it makes no difference, because even if the mail does not get through the tube as quickly as by the wagon the clerks could not handle it at the other end of the line.

Mr. K. E. STUART. Unless there are more than 50 clerks employed, and I think at Philadelphia the number employed on the heaviest mail is something like 25. Except in rare cases, the actual gain in time is the difference between the arrival of the first carrier and the wagon, not the last carrier. The last carrier has nothing to do with it. From the moment the first carrier arrives the entire staff of clerks is busy sorting that mail.

Then, with regard to the gain in time of outgoing mail. There is a certain gain for each train. Consequently, the more frequently the trains are, the greater the advantages of the pneumatic-tube service. The tendency is to increase the frequency of the trains each year. There is a great deal of discussion regarding the use of electricity for the railways. It is not at all impossible that within a measureable time we may use cars dispatched individually instead of in trains. Consequently, the dispatches will be much more frequent. This is a condition that is going to enhance the value of the pneumatic-tube service each year.

With regard to the local mail, or mail that originates in a city for delivery in that city; there the advantage of the tube is more marked, because it deals with the mail throughout its entire transit from one station to the other. As has already been pointed out, if a special-delivery stamp is put on the letter, it not only starts immediately, but it is delivered immediately and becomes as quick as a telegram. Besides, it is very much cheaper and is available for the dispatch of documents. The advantage of the tubes for local service depends largely upon the frequency of the deliveries, and there again we have something which is tending to enhance the value of the tube service. The report of the commission of 1908 gives the percentage of mail handled by tube that is actually advanced. I think that is very misleading, particularly with regard to the mail received, for the reason that they have calculated the difference between the time of the last carrier and time of the arrival of the wagon. But those figures show one very interesting fact: That is to say, that the percentage of mail handled by tube actually advanced, increased, as the system is extended. You will note the percentage of saving on some of the outlying lines is 100 per cent; and on some of the short lines it is only 10 per cent. So there is still a third cause tending to improve the efficiency and value of the tube service.

That is all I have to say with regard to the application of the tube to the postal service, but I am here as representing the efforts to introduce our system abroad, and if there are any questions that the commission would like to ask me with regard to the foreign development I should be glad to answer them.

The CHAIRMAN. You say you are going abroad?

Mr. K. E. STUART. I have been engaged abroad a number of years in the effort to introduce our system there.

The CHAIRMAN. Have you met with any success?

Mr. K. E. STUART. I have designed the electric dispatch system which has been spoken of by Mr. Murray. We have submitted tenders in Paris and in London for the construction of pneumatic-tube lines. Those tenders have been considered by a special commission.

The CHAIRMAN. Pneumatic-tube lines for the transmission of mails?

Mr. K. E. STUART. Yes. This special commission came to the conclusion that while the tubes would be desirable later for connecting the outlying stations, for immediate purposes what they required was something that would deal with all the mail and would get it all underground. The requirements in Paris and London are somewhat different from the requirements in this country. There the first consideration is to relieve the street traffic. Consequently, what they wanted was something to put all mail traffic underground, and the result was that we were asked to design a system especially for that purpose. It is an electric system that makes use of small cars that are run through a tunnel. Reference has been made to it at earlier hearings of this commission. We have no contract as yet.

The CHAIRMAN. Did both commissions in France and England ask for that sort of a system?

Mr. K. E. STUART. They did. Provision is made in these tunnels for the pneumatic tubes. The tubes would run through the same tunnels and go on to stations beyond where the quantity of mail would not justify the electric system. These tunnels are only suggested for cases where there is a certain minimum quantity of mail and where it never has to break bulk. The quantities of mail dealt with in the two cases I have in mind reach a hundred tons a day. I believe there are very few instances in this country yet where anything like that volume of mail is handled. The electric system could obviously not be justified in a great many cases in which even the pneumatic tube has an excess of capacity. The electric system, furthermore, is not as rapid as the pneumatic tube and can not be made so. The speed of transit is somewhat less, because it takes more time to accelerate the heavy cars, but the principal difference is in the fact that whereas a pneumatic tube starts in the center of the sorting space in the post office, the electric system cars have to start from the basement. Then, again, you can send a single letter immediately by pneumatic tube, and with the electric system you can scarcely afford to make a dispatch unless you have two or three bags of mail. We have in every case provided for pneumatic tubes in the tunnels, and the two systems are considered inseparable. One supplements the other. The electric system is intended primarily to get the mail underground and incidentally expedite it as much as possible. The pneumatic-tube system is intended primarily to expedite the mail and incidentally to get as much of it as possible underground.

Mr. MURDOCK. Will you kindly explain why, Mr. Stuart, it is not practicable for this Government to secure the right to put tubes in the subway in New York city?

Mr. K. E. STUART. I believe the question is purely a practical one, as there is no room for them there. So far as I know, that is the only obstacle, assuming, of course, that the subways pass somewhere near the points that it is desired to connect by pneumatic tubes.

Mr. MURDOCK. Would it not have been possible in the original construction of this subway to have made room for the tubes?

Mr. K. E. STUART. I see no reason why space should not have been allowed, and I think it was an unfortunate oversight that it was not done, but, of course, we did not build the subways, and had no way of securing the space.

Mr. MURDOCK. Some were constructed subsequent to the construction of the tube lines, were they not?

Mr. K. E. STUART. Some were.

The CHAIRMAN. When do you expect to get a reply from the foreign governments as to your offers?

Mr. K. E. STUART. I should think within the next three or four months. We have built a trial line in England. It has been approved by the postmaster general of Great Britain and also by the French postmaster general.

The CHAIRMAN. Where is the trial line?

Mr. K. E. STUART. It is at Chelmsford. It is 30 miles from London.

The CHAIRMAN. There is one in Paris also, you say?

Mr. K. E. STUART. No; the only one is in England. The rights for Philadelphia have been purchased by the Pneumatic Transit Co. and they are considered inseparable from the rights for the pneumatic-tube system.

Mr. STEWART. And it is these rights that you speak of as transferring to the Government with the other rights in case of a sale?

Mr. K. E. STUART. Yes, sir; that is so.

The CHAIRMAN. Is there anyone else who wishes to be heard?

Mr. MILHOLLAND. One question raised by Mr. Murdock was not, perhaps, answered as fully as might have been by Mr. Stuart, our engineer. It was in reference to carrying the tubes into the subways. That inquiry applies to London and Paris as well as New York. As one having had something to do with tube construction, let me explain that if the subways originally had been designed for pneumatic tubes they might have been utilized in part, but one difficulty now is that they are getting subways deeper and deeper. In London they go in places 60 feet below the surface. The Central London line illustrates this remark. It would be necessary therefore for us to be digging down through 60 feet of earth at every station. This would be very objectionable. It is not so much, then, the lack of cooperation between the municipal authorities, those interested in the subways, and the tube people, as it is the physical and practical obstacles.

The post-office departments in Paris and London look forward to controlling the plants or systems for parcel as well as for letter delivery. They look forward in London to a system of underground transportation for the mails and the parcels complete ultimately in itself, and in no way related necessarily to subways or other existing means of transport. They expect ultimately, I am told, to do all the urban deliveries of the big department stores, or, in brief, to handle the bulk of the parcels of all London, a colossal task, but highly lucrative. Until the advent of the big mail tubes and electric tunnels for parcels and light luggage neither the post office of England or France or this country could do the parcel-post delivery in cities any better than the big shops or department stores, because the foreign Governments had no facilities for such work not possessed

by the stores, namely, automobiles, carts, and wagons. Macy, Wanmaker, and Siegel, Cooper & Co. have just as good facilities for delivery of nontubeable matter—that is, more than 8 inches in diameter—as the Government, but with an underground system of delivery the Government, should it purchase and develop a complete system, is going to be in a position to handle this city delivery of the big stores as well as that of the general public.

Mr. MURDOCK. You believe that in the ultimate dispatch of mail in the large cities the underground transmission will include in the broken bulk packages the larger packages?

Mr. MILHOLLAND. Certainly; everything except such things as pianos and bedsteads.

Mr. MURDOCK. So you think that virtually all mail transmitted will eventually go under ground?

Mr. MILHOLLAND. Undoubtedly; in all congested centers of population. It is not choice, but necessity. Look at the paradoxical conditions we have to-day. Millions and millions of men and women riding underground, through the bowels of the earth, in all the big cities, and yet you are carrying your mails and your parcels up on the surface, blocking the streets until they are becoming almost, at times, impassable, although every essential problem of underground mail and parcel transmission has been worked out.

Mr. MURDOCK. Of course, the one thought that enters my mind when you make mention of the live freight underneath and the dead freight above is the matter of cost. The live freight will pay more.

Mr. MILHOLLAND. Not necessarily—in proportion—if proper contracts be made between the Government and the tube companies. That has been made the bete noir of the whole pneumatic-tube development. Until it is worked out properly, completely, along rational business lines, it is open to the objections that you make against the Upham Corners line. That station stands out isolated; it looks very formidable; but when you have a great complete system with stations all connected up, you find that one or more stations of this kind mean no more than an occasional nonpaying telegraph office or scores of little way stations on the Atchison, the Union Pacific, or any other railroad; these do not pay the company directly to keep open, but must exist for public convenience, a factor in the situation that can not be ignored by any civilized Government.

There is another point: You dwell upon the cost of tube service. We take issue with you by asserting that it can be made the greatest revenue producer of the Post Office Department. It costs a dollar to send a telegram to San Francisco, but you can send a letter there as long as your arm for 2 cents. What do you pay the 98 cents for? Time. But for this tube service the post office charges nothing extra to the public. The tubes can beat the telegraph in local delivery ninety-nine times out of a hundred, and did the post office charge in proportion for expedited letters what is charged by the telegraph companies for the saving of time on urban messages the tubes would be a source of revenue to-day unparalleled in the department. Look at practical results in New York. It formerly required $1\frac{1}{2}$ to 3 hours to cart letters from the Grand Central Depot to Wall Street; it is done now in less than 20 minutes, but the people pay still only 2 cents postage for all this speed.

The larger proposition, however, which I judge to be in the minds of you gentlemen who are working on this problem from the Government's viewpoint is that we have reached a point now where, owing to congested conditions in large cities, we must take into consideration the clearing of the streets of what can be taken out of them. You must do so and the only way is underground. It does not relieve the congestion by putting on more mail carts, vans, or automobiles. It only makes things worse. Commissions in France, England, and other nations have worked upon this question for years. They have reached the same conclusion, viz, that you can not have a complete and satisfactory mail and parcel delivery if you do not go underground in big cities.

Mr. MURDOCK. Is that true, though?

Mr. MILHOLLAND. It is. The pneumatic tube handles the mail in detail; the tunnels and the larger tubes will handle it in bulk. You must have in this detail your continuous movement. You should not wait for your mail until I write my letter; you want yours dispatched at once; so do I; so do all. The pneumatic tube comes in with the unit—one letter, one card, one telegram, one parcel. When you come to the larger bulk, the parcels and big packages, then you take the larger facilities, the tunnels or bigger tubes. If you go back to the original postal reformer, the great Cromwell, what do we find confronted his genius? Why, they "waited for the load." He said this was all wrong; the mail should go at a fixed hour be the load big or small. We go a step farther. Not waiting for the load, the pneumatic tube takes it up instantly, one letter at a time if need be. It is moving, moving, moving all the time to its destination, and the time will come when those destinations will be much more frequent—ultimately, as the late Postmaster General Smith held, the individual house or office—than they are now. You will not, then, Mr. Murdock, shrink back from an "Upham Corners." You will take the larger view of the case, the larger, the more correct and comprehensive.

Mr. MURDOCK. Postmaster General Samuels gives emphasis to the fact that the very heart of the whole system is the pneumatic tube.

Mr. MILHOLLAND. I would prefer to say that the English postmaster general seems to consider it a very important part; it is included in all our foreign estimates, as you will see by our Paris tender now before you.

Mr. MURDOCK. And yet the London service rejects the letter in the tube and takes the telegrams, as I understand.

Mr. MILHOLLAND. Let me explain the present tube situation in England and the Continent: The entire tube plants of Europe are mere toys in comparison with the American development. The Philadelphia lines last week handled more matter than were handled during the entire year of 1912 by the little pneumatic tubes of London, "Le Petit Bleu" of Paris, the "Rohrpost" of Berlin, the tube systems of Vienna and Budapest, and all the other pneumatic-tube systems of Europe. Yes; all they have done in a year would not equal what was done in Philadelphia last week.

The CHAIRMAN. But there is a good reason for that; they are not so anxious for their deliveries as we are.

Mr. MILHOLLAND. I think you will find that they want their mail promptly, and London's existing postal system is highly creditable considering the fact it is as yet without tubes or tunnels. They have

had a long experience in working out practical conclusions. London, you must remember, built the original big tube or tunnel, 3 by 4 feet, from the post office to Euston Station. It did not work satisfactorily. It was a failure. The detailed expense of this, more than \$1,000,000, was a total loss. It was not constructed properly, and for years and years engineers of Europe as well as America sat down and said that no tube more than 4 inches in diameter could be made a success. The first tube line put down in Philadelphia just 20 years ago was 6 inches wide and has been a success from the beginning. If you visit Philadelphia you will see that original tube after 20 years' service, and you will also see something of the crudity of the first terminal facilities, but likewise their practical efficiency. Then you will see how we went on from the 6 to the 8 inch tube, and now for their larger development. You will see how the larger tube comes as the logical outgrowth of the small ones until we are arrived at last to a complete system of underground transportation. In other words, we are now ready to meet the most exacting demands of the parcel post whenever the Government will make proper or ordinary business arrangements for this laudable purpose.

Mr. MURDOCK. Give us, offhand, the real reason for the failure of the first London tube. You said it was a mechanical reason. Why did the Duke of Argyle system fail to operate?

Mr. K. E. STUART. Because they proposed to operate it by compressed air, and compressed air is not suitable for operation of tubes of that size. It is now proposed to operate such lines by electricity.

Mr. MILHOLLAND. I am one of those unfortunate individuals who took pneumatic tube securities, and because I am I would like to clear your minds on that point of discrepancy that seems to exist regarding the securities issued for the construction of this Philadelphia company—issued for construction at par—and the actual money put into the system. Suppose a contractor took in payment some stock under par and put the money into construction. He certainly believed that stock would ultimately be worth par; otherwise there was no profit in it for him beyond an ordinary investment, and this kind of security no banker would call an investment. The contractor soon found that the markets were practically closed to it. There is not a banking house of any standing in Philadelphia, New York, Boston, or Chicago that wants it. Why? They say, "You have, to be sure, a great public enterprise, one that seems indispensable to modern post-office needs, but you only have 10-year contracts and how do you know they are going to be renewed?" We reply, "Faith of the Government, in the efficiency of the system, and the public requirements." They say, "What happened in 1910? Didn't they beat the appropriation?" They did. That brings us back to this fact that we are still dependent upon Congress year by year, which injects an element of uncertainty disturbing to sound finance.

A word more. All the companies are restive in the position that seems to be assigned them. Coming over here to discuss the subject with you they are made to appear as begging the Government to buy them out. This is not fair; it is not true; it is very unjust to us. Mr. Hayden expressed the matter to you plainly when he asked that you "give us broader contracts, contracts that we can finance with any high-class banking house. Then we can distribute our securities and

go on with the work to any extent, as far as the Government demands."

Speaking in behalf of those who own the Philadelphia system and for President Mabon, let me add that they would consider an amortization proposition gladly, whether it be for 20 years, 25 years, or 30 years, so that it places us in a position where the investor is sure of the return of his capital and not be at the mercy, not of unprincipled men but oftentimes well-meaning, faithful public officials, men of the highest sense of civic virtue, but who, reasoning from insufficient data or imperfect knowledge of the facts, often do the gravest injustice to an enterprise. If I might venture to indulge in a personal reflection, and speaking for those who have had to do with public work, there are few times of activity that brings on the gray hairs and robs life of its joys more rapidly than such Government contracts as we have to work under. There is always anxiety when Congress gets together, not on account of any thought of deliberate injustice, but from this fact—and I can see it working in your minds this afternoon—that you and those like you in authority fear that in some occult way we are here working up something to get something out of the Government to which we are not entitled. I assure you that is not the fact. We ask no favors; only fair play. We have concealed nothing; we have nothing to conceal; every book is open to you.

All these securities were taken in good faith, and we believe every one issued by the Philadelphia system to be worth par, and if there is not a sufficient sum realized those securities are a serious loss to innocent holders as well as to us who know they represent value received in service by the Government.

My final thought is this: That if the Government, represented by your commission, could get down to this matter in a sort of cooperative way, as we have tried to do in London and Paris, and work out an amortization system by which the companies are reasonably protected and a fair profit is shown, we can quickly reach a satisfactory solution of the whole problem. If you want to take over the systems why, of course, it is in your power to take them, but if you give us proper contracts, fair to all concerned, we will go ahead and build you every foot of tube and tunnel that you want, under our patents which include, we believe, everything of importance known to science. We will build on the ordinary contractors' basis of profit and charge only in accordance with recognized terms of such undertakings. Our friends have tried to be perfectly frank with you this afternoon. It is vital to the company now that we should have no misunderstanding. You are entitled to all the facts that will enable you to work out to an intelligent conclusion.

The larger aspects of the case are connected with this tremendous parcel-post proposition. You know what is coming. You are likely to be overwhelmed in your post offices before very long, and the city streets blocked. You can make this an enormous revenue producer for the Government. There is no underground system—I do not care what is in the minds of any inventive genius here present—that can be made complete without the pneumatic tube in it. You can have all the various forms of transportation known and unknown, but you must take your pneumatic tube if you want perfection, not

only to accelerate all mail—for the farmers of Kansas and the miners of Colorado, but for those who go down to the sea in ships—for one and all the tube is a prompt, reliable, efficient servant that represents constant movement and that immediate delivery which is the essence of modern postal communication in the coming ideal postal system of the United States.

I thank you, gentlemen, for your courteous attention.

The CHAIRMAN. If there is no one else who wishes to be heard, the commission will now go into executive session.

Thereupon, at 5.30 o'clock p. m., the commission went into an executive session.

WASHINGTON, D. C., *Saturday, January 25, 1913.*

The commission met at 11 o'clock a. m.

Present: Senators Simon Guggenheim (chairman), Representative Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

ADDITIONAL STATEMENT OF J. E. MILHOLLAND, ESQ., OF LEWIS, NEW YORK, A STOCKHOLDER IN THE PNEUMATIC TRANSIT CO., OF PHILADELPHIA.

Mr. MILHOLLAND. I feel that I have made my way into this session this morning in the same way Mr. Howell said he made his way into literature, I wormed my way in. As I looked over the testimony and recalled some of the questions that had been put during the hearing, there loomed up in my mind some very serious considerations, so serious that, at the risk of seeming to impose upon you, I thought I would like to come over and just have a little frank discussion this morning, very briefly.

It seemed to me that, overshadowing this whole matter of tube purchase, there hung a question of the very largest import, the question of Government ownership, the acquisition of large properties, and their operation by the Government. Of course, that is a question that strikes deep into our form of government. I do not know that it strikes our form any more than any other, but it is a very profound question, and one that the average legislature approaches very carefully, and for good reason. Those of you who are familiar with the German railroads since the Government acquired them, and the Austrian railroads, can appreciate the importance of deliberation in taking that step. I am not here to discuss the political economy of it, but I want to call your attention to the particular bearing of this, namely, that you are not buying something that is of general use; that is to say, you are buying something which, while it touches the life of every citizen, is distinctly a Government proposition. It is the Government that is going to use this exclusively, and for its own purposes. You buy a railroad, and, of course, you are going into the railroad business, which everybody has to do with. In this all your business comes in through the Government. That is where it is differentiated from almost any other great utility you take up.

The second question is, it seems that notwithstanding that fact, it is only a question of time before this will assume a very much larger significance. Every bit of statistics that we get from all over the world goes to prove that sooner or later the Government, or whoever takes hold of this business of underground transport of mail and parcels, is going to run into a tremendously large development, and that somebody has to do it, whether it is the Government or a private company, is demonstrated as conclusively as a problem in Euclid.

Take, for example, the increase in the carriages of Paris in the seven years between 1902 and 1909. The increase has gone from 70,000 to something like 82,000. Bicycles have nearly doubled. There are something like 270,000 bicycles and 60,000 carts of various characters—hand carts, four-wheel carts, and such as that. The increase since 1909 is still more striking, though we have not the figures complete, although we expect to have them in a very few days.

That is not the most significant part of these statistics, namely, that the modern carriage, the automobile, the tricycle, and the bicycle, going very much quicker, really occupy, in comparison with the old horse-hauled carriage, about three times the space, and that is where your pressure comes, not only in Paris, but in London, in New York, in Philadelphia, and all the other large cities. That is the distinctive pressure of the modern carriage development, and you are not dealing with the actual increase in the number of vehicles, but you are dealing with their more rapid distribution through the streets.

Mr. MURDOCK. Is not that dual, however, in its action and in its effect? The automobile which moves quickly to a given point and occupies that point for an infinitesimal part of a second, also moves away from that point and relieves traffic?

Mr. MILHOLLAND. Yes, sir; but what we have to deal with is not the vehicle so much in rest as the vehicle in motion. That is the problem. It is the movement of the vehicle, whether it be an automobile, or a handcart, or a bicycle, or a horse-hauled carriage. That concerns us, and that makes up the procession through the streets.

Mr. MURDOCK. I have in mind a street through which heavily laden work wagons pass. Surely a given number of vehicles of that type, say 100, would cause more congestion at any one point along that street than 100 rapidly moving automobiles?

Mr. MILHOLLAND. Let me get your point.

Mr. MURDOCK. In other words, my thought is this: That the more fluent a traffic, the less congestion there is likely to be. You are making just the opposite argument.

Mr. MILHOLLAND. Yes and no. The congestion of traffic we have to deal with in a practical way is covered by the term "regulation." The reason New York can handle its traffic, greatly increased as it is over what it was 10 years ago, has been the science of traffic regulation that has been worked out there in New York, following London and Paris. But you go to Capt. O'Brien to-day, of the traffic squad, and he will tell you that they are getting to the limit of what can be done in the area of New York thoroughfares, even with the best regulations that are at their command. There is a limit. Your point about the quick-moving vehicle is a modification. I concede that

there is a certain modification, but, Mr. Murdock, you get to the point where even the modification is of such slight effect that you are crowded to the doors.

Mr. MURDOCK. I did not intend to divert you, and, of course, I acknowledge that there is an increasing congestion in the streets.

Mr. MILHOLLAND. That is the point I want to drive home. You find that very strikingly brought forth in the board of trade report as to London. It is not a question peculiar to one city. The problem in all great cities in this matter is very impressive as you study it. It is what everybody feels; it is what the great delivery houses feel. Since I had the pleasure of appearing before you I had a 2-hour talk with one of the largest department store managers in New York, and he said exactly what Mr. Wanamaker said several years ago.

The CHAIRMAN. Would you like to have the report of the board of trade printed?

Mr. MILHOLLAND. I was going to mark that so that you would not have to wade through a great mass of unimportant matters.

Mr. MURDOCK. You were about to tell what Mr. Wanamaker said.

Mr. MILHOLLAND. Mr. Wanamaker said seven years ago: "This question of parcels underground is not debatable. That has all passed all discussion. All we want is the end of the tube or the tunnel in the establishment, and we are prepared to use it and do away with our old carts and wagons at the earliest opportunity." That voices the general sentiment. If you will take it from all the large cities here and abroad, you will find a perfect unanimity of sentiment, whether it is the expression of Siegel, Cooper & Co., Whiteley & Co., or Demorest, of Paris—everywhere you go you will find the desire of large concerns is to get rid of the old mode of delivery. Why? There is a certain advertising value in their wagons going about the streets, but they are perfectly willing to forego that. Mr. Straus told me last week that that counted for nothing in comparison with getting their goods delivered promptly and that the congestion of the streets was becoming such that their deliveries ran into all hours of the day and night. They have gone so far that they are sending their stuff up into the upper part of the city by huge vans and using those vans as a central depot from which to make their deliveries the following day. You are not discussing anything of an academic nature, a theory; it is actual conditions that you will satisfy yourselves on when you make this trip into the large cities.

The next point—and I am trying to keep to the theme I announced at the beginning that seems to me to be perplexing, namely, the question of Government ownership—to rid that of as much objection as possible, even in this country, where it seems to be the exception to the rule, I fall back on the suggestion I made to you at the hearing the other day, namely, why buy out? Why not control this? We do not want to sell out. We are perfectly willing to develop under the guidance and operation of the Government, develop this proposition, which is one in its infancy. Look at it. The tube was begun about the same time as the parcel post. You are paying forty millions out for your parcel post.

Mr. STEWART. Rural mail delivery, you mean?

Mr. MILHOLLAND. Pardon me; I confused the terms; you are paying forty millions out for rural mail delivery, and you are paying less than a million for the tube. Forty millions for the accommodation of the country districts, less than a million for the city, which is the one gap in our modern progress. The trains fly from city to city 60 miles an hour, and when they strike the depots down goes your rate of delivery to about 4 miles. The report is that the best time that can be made in the city is between 7 and 8 miles, and that is exceptional. There is the gap that has not been covered, and why has it not been covered? Because this question of underground transport in the large cities has never been worked out clearly by a tribunal with power to give effect to their conclusions. It has been done with the best of intentions by the department and those interested in a sort of rule-of-thumb way. It has never been worked out to show how profitable that service can be made to the Government. In other words, it has never been dealt with in proportion to its importance.

Mr. MURDOCK. That is a very interesting impeachment. I can not say I agree with it at all. As a matter of fact, in the larger cities in the United States we have developed the tube system to the point that we are expediting a considerable amount of the outbound mail to the station from the post office, and the gap which you designate has been filled to that extent.

Mr. MILHOLLAND. Whatever is in this world is by comparison, I think you will agree, Mr. Murdock. My point is this, that whatever you have done, this 50 or 60 miles you put down of the 8-inch tube, you have not, in any single case, completed the system in one city so as to get the full benefit of a complete service. Furthermore, you have not made the provision yet by which the tube service would stand in the position, inside the city limits, that a railroad system would stand in covering an area of territory that had been assigned to it. There are missing links constantly being brought to the attention of the department, sometimes in an embarrassing way, and wherein justice is not done. I am not giving you that as a grievance, but only as an illustration. You see that, and it jars. If they were united it would be a different proposition. But beyond all that, you have only got two tubes whose capacity for the first-class mail is unlimited.

The next stage of the development that is being forced upon you is the parcel post. The parcel post is coming, and it will come, in all human probability, by leaps and bounds. You must meet that. The larger development is impending, and it is that larger development that I want to draw your attention to particularly and say that here is the foundation for a complete system that, if allowed to be developed by those who worked it out from the beginning and solved the problems so far as they were permitted to do so and were able to do so, will fill your needs. It seems to me you stand at the threshold of a mighty important development in transportation.

Mr. MURDOCK. Specifically, and along mechanical lines, what would you suggest?

Mr. MILHOLLAND. I would suggest that you give us contracts that will enable us to go on and develop these systems in the various cities, not only the tubes and the larger tubes, but, where needed, the electrical tunnels.

Mr. MURDOCK. A perfected underground system for the underground transmission of mail, would, in your opinion, comprehend not only an 8-inch tube for the dispatch of letters in small lots, but the larger tube for the dispatch of unbroken bulks of letters, and, in addition to that, a third tunnel carrying, under electrical power, some sort of vehicle which would carry the mail sack which contained the parcels?

Mr. MILHOLLAND. Not only the mail sack, but everything that came into the post office for transmission; in Paris and London it is 6 by 2 by 2, in round numbers.

Mr. MURDOCK. Then, in your perfected system, you would have three different vehicles for the conveyance of the mails, three or more?

Mr. MILHOLLAND. Yes; all united in one system.

Mr. MURDOCK. I understand; but you would have three ways of transmitting mail matter underground?

Mr. MILHOLLAND. Yes; mail and parcels.

Mr. MURDOCK. I mean anything that isailable?

Mr. MILHOLLAND. Yes. I am looking toward the diversion of all this big business, this parcel business of the great cities, of the Wanamakers and Maceys and of the Siegel Coopers, into these tubes and tunnels. That is inevitable, whether you do the business or private companies do the business, whether it is done under supervision or entirely in the hands of a private company. That is inevitable. That is to say, if you do not do it that sort of a system will be worked out just as surely as the Chicago subways were blunderingly constructed and are now being reconstructed. There are certain things that have happened on our side as well as on yours. I need not dwell on the fact that the parcel post is a great development and is of tremendous significance. We have met and solved a problem which has been the deterrent factor in this development, namely, this, when you take your pneumatic carrier it is dispatched without further ado, it is sent out from the transmitter and received at the other end of the line, and nobody has to go with it. But when the Old World governments came along to the car, then they had to do just what our friends in Chicago have had to do in their subway—they had to put a man on the car, and the result was that the fixed charges became terrific, and the result was that that company was put in the hands of a receiver.

Up to two years ago the English post office had not an idea in its head, and said so frankly, as to how they could run these cars without a man on them. When you put a man on them your charges were beyond any serious consideration by the Government. The automatic car solved that problem. The car is dispatched and handled exactly like the carrier. It is all worked by the keyboard, and the result has been of far-reaching import, and it has been in harmony with the tube development, whose great advantage was that it did not require anybody going along with the carrier.

Mr. STEWART. I understand, Mr. Milholland, that your system of a small tunnel with an electric car, together with a tube of the size that we now employ, would furnish practically all the service that would be required, in your opinion, to move packages and parcels and mails; that is to say, you would not need the intermediate tube

which Mr. Murdock referred to—for instance, a large tube—as well as a small tube, in connection with your cars?

MR. MILHOLLAND. There are places we are constantly coming in contact with where it is of especial value to have a large tube. My point is this, that you have the facilities, and it is simply a question of where you will use this particular kind of transportation or use the other. I have a graphic picture here, Mr. Murdock, which will give you a very clear idea of the thing.

Mr. Milholland thereupon exhibited a photograph to the commission.

That gives you a graphic picture. So that the system is absolutely complete, and the parcels and the mails would go through without any difficulty. Again and again the tubes of New York and other cities have saved the newspapers their distribution through the country. You spoke the other day about having an eye on the stalwart farmers of Kansas and the miners of Colorado, and I call your attention to the fact that the newspapers in the large cities would bear testimony that they would not have gotten their newspapers out, and would not have gotten their mails, if it had not been for the courtesy of the Government in the use of their tubes.

The main question is this, that you are all very busy men, and I think it was Abraham Lincoln who said that it was only busy men who could be gotten to do anything in this world. I do wish you could transfer the seat of your deliberations over to where you could see these things in operation. I think it would facilitate your deliberations wonderfully if you could get over there and see everything I have been talking about in actual operation, or else in the form of moving pictures.

MR. MURDOCK. Have you given any consideration to the possibility, even though it be remote, of such a development in aeroplanes that underground transmission of the mails might eventually disappear?

MR. MILHOLLAND. You know that was tested, and practically. My old friend Capt. Wyndham started a post office, by the grace of the Government, down at Windsor, and they ran the mails there as an experiment, and of course it was a failure. But that is no argument against it. It is only a question of its not being developed. But I do not see how you could go to work and consider an aeroplane development, knowing the space that is required, from all we know of the science at the present time—the space for descent in the large cities, and for ascent. You are bumping right into the great trouble that confronts us to-day, the great obstacle in the way, namely, you have not the space for your wagons, for your automobiles, for your carts. If you could imagine a city where there would be perfect freedom of thoroughfare, and there was ample room for everybody, the pressure to go underground would not be so great for passengers or parcels. I can not conceive of an aeroplane along the lines of the present stage of development. I can not see where you could get your space for your rapid dispatch. You must remember that this rapid dispatch, this delivery of the letter the minute it comes in, getting it on its way, and getting it to its destination, is the ideal to which the post office is working.

Mr. MURDOCK. Following a similar line of thought, have you ever given any consideration to an overhead carrier system?

Mr. MILHOLLAND. You mean using the telegraph wires?

Mr. MURDOCK. Using something above the telegraph wires, of course, in a city.

Mr. MILHOLLAND. In the first place, you know in a city the telegraph wires have been cut down relentlessly. You know the trouble we have had in case of fire, etc. It was a healthy sentiment; it was not anything irrational. There was an experiment made down in Rome, when we were bidding on some Rome contracts four or five years ago, but it was quickly decided to be impossible.

Mr. MURDOCK. It was attempted in Rome?

Mr. MILHOLLAND. They put up a line in the outskirts. You can run your parcel along just as you can on the little trolleys in the dry goods stores. There is no mechanical difficulty in the way. Your difficulty comes from being confronted by an enlightened municipality, and they are all getting more enlightened. Whether you would have your transmission by the old telegraph-wire system, no matter whether it is high over the roofs or anywhere else, it is still open to the old objections of the telegraph system, which was removed entirely.

Mr. STEWART. I will say we considered that in New York for a line between the Pennsylvania and the New York Central and found it was not practicable. I suggested that to a commission that was appointed.

Mr. MURDOCK. Just in what point was it impracticable?

Mr. STEWART. Mainly from the points of view suggested by Mr. Milholland.

The CHAIRMAN. I do not see how you could get the permission from the authorities of the cities.

Mr. MILHOLLAND. The householders objected. The reason they had to build the tremendous system of subways was that the householders were in open revolt. I am very glad to have you bring up these questions, because if anything I say is of any value it is worked out of a very hard experience. I have had to do with this business a good many years, at home and abroad, and all these questions which at first blush seem to be of easy solution, when you come to work them out in actual practice assume an impossible form very rapidly.

Mr. STEWART. Let me suggest a further point about the aeroplane service, in which I am very much interested myself. I asked a \$50,000 appropriation last year, and did not get it, to install a general experiment service. It would involve, you recognize, the placing of a man in the aeroplane, and that brings up the same problem they had out in Chicago with the tunnel service—they had to place a man in the car, which made the service so expensive that they ultimately found the cost of operation so high that it could not be considered at all.

Mr. MILHOLLAND. I think it is only fair to say, in answer to Mr. Murdock's question, that the application of the aeroplane between cities is another question entirely. I have not discussed that, because our proposition is of limited area. Ours is a strictly intramural proposition. We are dealing with the delivery of parcels and packages in large cities.

Mr. MURDOCK. My question went wholly to the proposition of the carriage of mail within the large city.

Mr. MILHOLLAND. I think the issue is very clearly defined. It is possible in what I have tried to say in this desultory manner about the delivery of parcels in large cities that it may seem to you a little Utopian. It is nothing of the kind. The real logic of the situation, if you will go to its full lengths, points to this conclusion, that there is really no more reason, logically speaking, why a great firm should do its own delivering than that a great manufacturing plant should own its own railroads and ships for the delivery of its wares all over the country or all over the world. It is a distinct business, a business of transportation, whether it be within the city limits or between cities, and it reaches rapidly a point where it requires a company or a concern who will give itself, its energy, and its ability and experience entirely to that. That is the point I want to emphasize, and because it is one so clearly in the minds of these merchants to-day and they are looking forward to relief, that brings us right to the crux of the whole matter, who is going to give them the relief? Are you going to do it through a private company or is the Government going to take up this tremendous undertaking?

The CHAIRMAN. I would like to hear what your proposition is for your company and what policy are you in favor of.

Mr. MILHOLLAND. If I were asked to outline a policy in very general terms to-day to this commission, I would say, abolish the present contracts and give us a contract for a definite period of years, long enough to enable us to amortize the contracts so that there will be no question about the principal coming back.

The CHAIRMAN. At that point, contracts for how many years?

Mr. MILHOLLAND. We have worked it out. We have a proposition we were going to submit to the commission. If you will give us a slight increase on your annual rentals—it is not heavy—we will enter upon a contract with the Government to go on doing this business, and at the end of 25 years turn the plants over in first-class condition to the Government; that we will build anything you want built at actual cost, plus the usual contractor's profit of 10 or 15 per cent, all bills passed upon by the Government engineers. We will take that construction as finished, capitalize it at actual cost, and, with the same kind of contract, after operating it, have it turned over at the end of the contract period to the Government, one right after the other; or we will build for the Government and turn it over, if they desire to have immediate possession. But what we want is the exploitation of it, the development, the carrying out, of these ideas we have worked out through all these years. The Government is protected in this way, that, as this development goes on largely, you have your hand on it; you know it is going to come to you as certainly as the subways in New York are going to come to New York, just as the subways came to Paris at the end of a certain period of years. The contracts are clearly defined. You know exactly what we are going to make. You know exactly where your supervision ends and where our initiative has a free scope.

If you do that, you get the benefit of all this experience, you get the benefit of the individual initiative and enterprise, you get all the new patents that are constantly coming out. Improvements are going on; you can not limit human invention. That is going to tell

to the advantage of the Government, and at the same time you are relieved from this assumption by any development of the operations of a company that they have not really had time to familiarize themselves with, and I do not say they can not do it readily, but what I do say is this, if you take it right over to-morrow, pay us our money, and tell us to go about our business, you will lose a factor that is more important than any cash consideration. I am putting forward that plea, gentlemen, because it seems to me that it presents a solution of the question, it presents the acquisition of these properties by the Government in the modern, scientific form, in the form that is practiced all over the civilized world to-day, and it also gives due consideration to the importance of the individual enterprise.

The CHAIRMAN. What advantages would your company have under the arrangement you suggested?

Mr. MILHOLLAND. Mr. Chairman, we would have this advantage, that, instead of having our securities, as we have now, on our hands, we could go and market those securities and distribute securities, as any large enterprise must be handled. You can go into any bank in the large cities, and there will be no difficulty at all about making such a distribution as is fair and equitable. The Government exercises, all the time, such a supervision as would make it impossible for us to have to spend the long time we spent here the other day showing you those petty details.

There was one other point; the relationship of the Government to the enterprise becomes so clearly defined that it is something that can be spread out at any minute it is called for. There would not be a single mystic feature about such a proposition, and I have the highest authority for saying that those contracts can be drawn so that there never need be the slightest misunderstanding. You have to have, of course, special congressional authority. I believe the contract now is limited to 10 years, is it not?

Mr. STEWART. Ten years; yes.

Mr. MILHOLLAND. A 10 years' contract is unjust to the Government, just as it is to us. You have to go and sell your securities to Tom, Dick, and Harry, who will take them at their own terms, and it is not a thing that any Government can contemplate.

Mr. MURDOCK. I want to ask you if you can tell me why the history of the pneumatic tube service shows it, on its investment side, to have been so unprofitable. I want it for the record. I want an answer for the record that will be illuminating.

Mr. MILHOLLAND. I have prepared an answer, Mr. Murdock, in a little detailed form, which I should be very happy to file with this commission, and which I think will set forth the reasons to your complete information. Whether it is to your satisfaction or not, I am not prepared to say.

Mr. MURDOCK. I wish you would include it in the record, because I want that fact set forth with as much detail as possible.

Mr. MILHOLLAND. I am really grateful for that question, because it will enable us to clear up the story of the tube. The financial history of the tube is really more relevant at this moment than the mechanical history. No one questions the success mechanically, but the point you have raised touches the financial side, and I shall be very glad to submit it. I would like to answer it in the form most satisfactory to you,

The CHAIRMAN. I should like to have it in that form, because it may remove some prejudice that may exist.

Mr. MILHOLLAND. I shall be very glad to submit it.

Thereupon, at 12 o'clock noon, the commission went into executive session.

EXECUTIVE SESSION.

Present: Senator Simon Guggenheim (chairman), Representative Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

**STATEMENT OF MR. ALFRED BROOKS FRY, CHIEF ENGINEER,
UNITED STATES TREASURY SERVICE.**

The CHAIRMAN. We are very much obliged to you for being here to-day, Mr. Fry.

Mr. FRY. Mr. Chairman, I am on duty as the supervising chief, engineer of the United States public buildings and superintendent of construction for the ports of New York and Newark. I am also detailed to the United States Immigration Service in a similar capacity.

The CHAIRMAN. We want to get some information from you, Mr. Fry, in reference to the service tubes in operation in New York and elsewhere.

Mr. MURDOCK. You are in charge of a tube between the custom-house and the appraiser's stores?

Mr. FRY. Yes, sir.

Mr. MURDOCK. A tube owned by the Government?

Mr. FRY. Yes, sir.

Mr. MURDOCK. What is the size of it?

Mr. FRY. Eight-inch. The distance between the two buildings is approximately 11,000 feet. The receiving and dispatching mechanism is identical with that used by the Post Office Department, and the system is virtually the same as that used by the Post Office Department.

Mr. MURDOCK. To what percentage of its capacity is that tube used?

Mr. FRY. It is used to transmit all the documents of every description between the appraiser's stores and the customhouse. At certain hours in the morning and certain hours in the afternoon it is used virtually to its maximum capacity; during certain intermediate hours obviously to a less capacity. The dispatch during the early working hours and the late working hours is on a 15-second headway.

Mr. MURDOCK. What is the length of its day—how many hours?

Mr. FRY. Normally about eight hours.

Mr. MURDOCK. What would the average for the day be in the use of its capacity? You say during the two congested portions it is used to its full capacity?

Mr. FRY. Yes.

Mr. MURDOCK. Take the average throughout the day; have you any means of knowing what the average would be?

Mr. FRY. Taking the whole day and extending its working hours, its capacity could be three or four times what it is at present. Personally, I have always assumed that it would become part of the post-office system of New York, because, logically, sooner or later, I should assume, there would be a connection made to the foreign station at Morton Street, and I should assume that ultimately that would become part of an extended system for the West Side.

Mr. MURDOCK. Have you ever made any tests to show to what percentage of its capacity that tube is used during the day?

Mr. FRY. No, sir; except the regular service tests; that is, of course, when the contract was completed, there were specified certain very complete, and I will say exhaustive, operating tests, where the tube was worked up, using, for instance, artificial loads in the carriers to the maximum capacity, and my recollection is on a 5-second headway.

The CHAIRMAN. What has been going through our minds is this: We have been in communication with certain engineers of New York, the firm of Stillwell & Co., of New York, to make a report for the commission on all the systems of the various cities. They have stated that, in their judgment, it would take them at least 90 days to make an exhaustive report to us. Do you know anything about them?

Mr. FRY. I know that Mr. Stillwell is a civil engineer and a member of the society, and anyone who is a member of the Society of Civil Engineers I think can be fairly said to be above reproach professionally. I have not the pleasure of knowing him personally. It may not be out of place, since I do not know whether you know it or not, to say that I was on the original commission, being one of the engineer members. Mr. Theodore C. Search, who was then the president of the American Manufacturers' Association, was chairman, and the engineer members were the late Prof. Thurston, dean of the engineering college at Cornell; Mr. Manning, the consulting engineer for the Baltimore & Ohio Railroad; Mr. Lyman E. Cooley, a very eminent consulting engineer, of Chicago; and myself. Then I was also attached, and I believe actually appointed, though I was unable to serve very actively, to the commission of two years ago, but I was so jammed with other work at the time that I could only consult with them in New York. So that I have a fair knowledge of the system in Chicago, and perhaps a little better than fair knowledge of the one in Philadelphia, and a very accurate knowledge of the system, obviously, in New York and in Boston, because I have had duty in both of those ports when the tubes were being put in originally; and, in fact, the routes I suggested in Boston originally to Col. Covency, who was postmaster when I was on duty there, very much to my surprise were afterwards used by the tube company. I thought, in the light of more recent investigation, they could find easier and cheaper routes than I laid out.

The CHAIRMAN. Are you a civil engineer?

Mr. FRY. Yes, sir; I have had a rather varied experience. I am a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the American Society of Naval Engineers.

Mr. MURDOCK. How much did the appraiser's stores tube cost?

Mr. FRY. The contract price was \$174,345.

Mr. MURDOCK. What is the annual appropriation for its maintenance?

Mr. FRY. There is none. We cover the expenses in our ordinary operating expenses. There is no specific appropriation.

Mr. MURDOCK. What are those operating expenses?

Mr. FRY. The operating expenses consist of electric power, which we furnish for the customhouse end, and steam power, which we furnish for the appraiser's stores end, the application of power depending upon the nature of the plant in each case at the respective buildings. Conditions seem to make it desirable to use steam power at the appraiser's store, since we have at that plant probably what is the largest steam-hoisting equipment in any building in the United States. We have enormous freight-elevator equipment. To the power cost should be added the wages of three operators aggregating \$2,520 and repairs and supplies, which last year amounted to \$672. The total operating cost for calendar year 1912 was \$5,694. This includes cost of power.

Mr. MURDOCK. Can you give the commission any idea of what the cost of that tube is annually?

Mr. FRY. I have made a definite report on that.

Mr. MURDOCK. I wish you would include that in the record, and include in that the annual cost of maintenance, including the renewal of the carriers.

Mr. FRY. Yes, sir; I have all that.

Mr. MURDOCK. I have asked these questions to lead up to the chief one in my mind, namely, if you as a private individual were asked to purchase a given tube, or system of tubes, in a city, what, in your mind, would be the first thing that you would want to know?

Mr. FRY. The first thing that I would want to know would be the conditions under which those tubes were installed, the character of the streets, and the soil along which the tubes were built, and then, subsequently, because it is more easily determined, the character of the operating mechanism—that is, the power-generating apparatus, and the receiving and dispatching apparatus. The most material thing, the greatest expense, is obviously the construction of the line, and to a commission with the general knowledge that this commission has, the trouble and expense of line construction in our greater cities is something that one does not need to amplify.

Mr. MURDOCK. Having concluded that these various topics were the things you should inform yourself upon, how would you go about to practically inform yourself?

Mr. FRY. For instance, as regards New York, I think now I have a good practical knowledge of what the conditions of those lines are in New York, because I am responsible for the power; I am not responsible, understand, for the operation of the tubes, but I am responsible for the power. For instance, we furnish to the lower portion of the lines in New York power at the Customhouse Building, at the General Post Office Building, and at the Brooklyn Post Office Building, and naturally any irregularities in operation, or any troubles, are immediately brought to my attention. I have a very competent office and a very competent engineering force, and part of our system requires that any derangements be referred to me, both at night, Sundays, and holidays.

Mr. MURDOCK. If you were a layman, Mr. Fry, you would at once hunt up an engineer who could go over this system and give you certain ideas about it. What would you expect the engineer to report to you?

Mr. FRY. I should expect him to report to me the date on which these lines were laid. I should expect a report from him that he had given due weight to the streets where there is liability of trouble from quicksand, and streets where there might have been leakage in sewers, where there might have been leakage from water mains, or where there might have been new construction that might have subsequently disturbed these lines. Then I should expect a special investigation of the trap system. My experience has been that troubles on these tube lines normally have come from two causes, one a derangement of the line itself, incident, usually, to the settlement or disturbance; secondly, the accumulation of water in those lines, when there are violent changes of temperature producing condensation. Therefore, the drainage of those lines becomes a very important thing. Any engineer can, without very much trouble, of course, make an examination, as I say, of the power equipment and of the receiving and dispatching apparatus.

Mr. MURDOCK. You would expect the engineers you hired first of all to identify and locate all the tubes under the ground; you would expect them to bring to you some information as to the physical condition of those tubes. Further than that, would you go into the matter of what it would cost to reproduce those tubes?

Mr. FRY. I think it should be done, always assuming that there was money and time available for such a research.

Mr. STEWART. Would you go into the matter of the original cost?

Mr. FRY. The original cost, of course, would have to be a matter of one's own estimate, backed up by such facts as could be properly authenticated.

I make no doubt that in many instances in the large cities, notably in the congested portions thereof, it probably would be more expensive to put in tubes now than it was to build the original lines, because, firstly, of more stringent municipal regulation; secondly, because of the introduction of larger water pipes and more of them, larger gas pipes and more of them, electric conduits, and in many cases, also, underground trolley tracks—that is, the plow trolley type. For example, I make no doubt now that the expense of running up School Street in Boston, crossing the Boston subway, and getting through Haymarket Square, would be very much greater than it was, let us say, 12 or 14 years ago, and it would be very, very much more expensive to duplicate the lines in the lower part of New York City than it was when they were put in, which I believe was about 15 years ago. That, I think, must be obvious to anyone on reflection. That condition may obtain in the vicinity of Adams and Clark Streets in Chicago. Whether it would obtain in St. Louis I would prefer to give some consideration to.

The CHAIRMAN. How long have you been employed by the Government?

Mr. FRY. In all very nearly 30 years. I have served under the Treasury, the Navy, and Commerce and Labor.

The CHAIRMAN. Would it be a practicable thing for you to make the investigation for the commission?

Mr. FRY. I have many times, through the great courtesy of the department, and in one serious case with the commission of the then President, been granted leave of absence without pay. For nearly six years I was a member of the board in New York, the advisory board of engineers. During that time I drew no pay from the Treasury for such time as I devoted to State work.

The CHAIRMAN. Have you any idea how long you would require to make an examination of the five cities?

Mr. FRY. I should say I could make a report on the present conditions, giving due weight to my present knowledge of the subject and my comparatively intimate knowledge of the conditions in Boston and New York, and some knowledge in Philadelphia and Chicago, within two weeks.

The CHAIRMAN. It would not be a complete report, would it, for the commission?

Mr. FRY. No; it would be a report as to the present condition of the system. I should have to depend on the cooperation of the municipal authorities in some of those cases, and I should have to require in each case the use of one or more men that I have been accustomed to employ in my own private work to assist me.

The CHAIRMAN. Would you have to take a corps of assistants with you?

Mr. FRY. No; I would not take a corps of assistants with me. I would take probably two men, and then, through the Society of Mechanical and Civil Engineers, I could depend on obtaining assistance from the men I know in all those cities, and in nearly all of those cities I have been in correspondence with men who have been accustomed to work with me, and in some cases for me.

The CHAIRMAN. Do you believe you have a more intimate knowledge of the tubes, and for that reason are you in a position to make a more accurate examination than any outsider?

Mr. FRY. Naturally, I do not want to appear egotistical, but I do not know of any engineer not connected with any of these various companies who has as large continuing knowledge as I have of them.

Thereupon, at 12.45 o'clock p. m., the commission proceeded to informal discussion.

WASHINGTON, D. C., *Wednesday, January 29, 1913.*

The commission met at 11 o'clock a. m.

Present: Senators Simon Guggenheim (chairman), Hoke Smith, Representatives F. L. Blackmon and Victor Murdock, and Hon. Joseph Stewart, Second Assistant Postmaster General.

ADDITIONAL STATEMENT OF MR. ALFRED BROOKS FRY, CHIEF ENGINEER, UNITED STATES TREASURY SERVICE.

The CHAIRMAN. At the last session of the commission I asked Mr. Fry to give us a statement of his credentials so that we might have them for the record. You have been working for the Government for several years, Mr. Fry, have you not?

Mr. FRY. Since 1886. Mr. Chairman, I have prepared the following statement of my engineering record for the commission.

The record referred to is as follows:

NEW YORK, *January 28, 1913.*

ENGINEERING RECORD OF ALFRED BROOKS FRY.

Member American Society of Civil Engineers; member American Society of Mechanical Engineers; member American Society of Naval Engineers. Engineering student, apprentice machinist, fire department and marine engineer, 1877 to 1886; assistant engineer, United States Treasury service, 1886; promoted to chief engineer same year. Since 1886 in charge of design, operation, construction, and repairs to steam, electric, and hydraulic plants in United States public buildings, with duty at United States Treasury Department, Washington, Boston, Chicago, San Francisco, Cincinnati, New Orleans, Pittsburgh, Galveston, and other cities and ports; now serving as supervising chief engineer, and superintendent of construction, maintenance, and repairs, United States public buildings, ports of New York and Newark, N. J. Since 1903 also detailed for additional duty as chief engineer to the United States Immigration Service, Department of Commerce and Labor, and in addition to work elsewhere—of the enlargement and rebuilding of the United States immigrant station, New York, including the enlargement of the original Ellis Island, and the design and construction of the No. 2 Island and of the No. 3, or hospital, Island of said station. Served also as consulting engineer for construction of boarding and ferry vessels for the United States Immigration Service, and also for water-supply pipe lines and submarine telephone and telegraph cables in connection with said stations; designated by Postmaster General of the United States in 1900 as a member of the commission to give consideration to the use of pneumatic tubes for transmission of mail, under act of Congress approved June 2, 1900; designated for similar service in 1908; engineer lieutenant, lieutenant commander, and commander in Naval Militia, Massachusetts and New York, 1893 to date; organized the First Engineer Division in Naval Militia of the United States; served as passed assistant engineer and acting chief engineer (lieutenant), United States Navy April 30 to September 13, 1898, Spanish-American War; holds United States marine certificate as chief engineer of ocean steamers without limit of horsepower or tonnage; from 1904 to 1911, inclusive, served, under Presidential permission and department leave without pay from the United States Treasury Department, as a member of the board of consulting engineers for the improvement of State canals, including the new barge canal system of the State of New York, for which work \$115,000,000 was voted by the State; has performed work as a consulting engineer for a number of individuals and corporations, also for the Association for Protection of the Adirondacks; now a member of the committee on inland waterways and water storage, Merchants' Association of New York.

ADDITIONAL MEMORANDA FOR COMMISSION, WITH SPECIFIC REFERENCE TO PNEUMATIC-TUBE WORK IN CONNECTION WITH TRANSMISSION OF MAILS.

I first took up work with reference to pneumatic tubes in 1894, and on April 16 of that year made a report to Col. Coveny, postmaster of Boston, in connection with the pneumatic transmission used by the Postal Telegraph system in Paris. This report gave a concise description of the system, and in substance stated that in a modified form it would probably be satisfactory under our working conditions in this country.

Thereafter, in 1895 and 1896, I suggested certain possible routes for the proposed Boston postal pneumatic tubes, and these routes were afterwards substantially followed, though I have sometimes thought it peculiar that the engineers of the pneumatic service company had not been able, with more time and better facilities than had I at my disposal, to have found less expensive locations for the lines referred to, some of the construction being very costly because of the narrow streets, heavy traffic, and other piping, conduits, etc., encountered.

From time to time between 1897 and 1900 I was in conference with various post-office officials and with various engineers connected with the pneumatic-tube companies, having in view the possible application of the pneumatic mail tubes in the cities of Washington, Chicago, Philadelphia, St. Louis, Cincin-

nati, and San Francisco. and in 1900 I was designated to serve as an engineer member of the commission appointed by the Postmaster General, under act of Congress approved June 2, 1900, which commission, under the chairmanship of Mr. Theodore C. Search, president of the American Manufacturers' Association, investigated the cost of construction, operation, and utility of all tube systems then offered for transmission of mails. The report of this commission was embodied in the report of the Postmaster General made to Congress under date of January 4, 1901.

In August, 1905, after conference with the postmaster of New York and other postal officials interested, and with the former president of the American Pneumatic Service Co., I made a study and report on certain proposed extensions to the postal pneumatic-tube service in New York City, and the recommendations in that report and routes suggested have been very largely followed in subsequent construction and extensions authorized.

In 1908 I served as a consulting member of the commission appointed by the Postmaster General to inquire into the desirability and feasibility of Government ownership and operation of pneumatic-tube service in the large cities. See report transmitted to Congress by the Postmaster General on or about December 15, 1908. Thereafter, when Congress made a special appropriation for a pneumatic-tube line to be owned by the Government and built between the United States customhouse and United States appraisers' warehouse, New York City, I made the original draft of the specifications and laid out the original route which was afterwards followed. When this work was contracted for by the Supervising Architect's Office, United States Treasury Department, I had charge of the construction of said line. Since its completion, in the latter part of 1910, its operation has been under my direction.

This system consists of a double line of 8-inch tube with a total tube length of about $4\frac{1}{2}$ miles. It is equipped with an electric compressor for service on one leg and a steam-driven compressor for service on the other, this equipment having been selected with reference to comparative cost keeping as well as to suit the operating conditions of the plants at the customhouse and the appraisers' warehouse, respectively, the former being an electrically operated plant, and the latter having most of its mechanism operated by steam, owing to the peculiar service demanded in this huge building which contains the largest steam-elevator equipment of any similar structure in the United States.

It may be added that there has been no interruption to the tube service between the customhouse and the appraisers' warehouse since the same was started. The operating cost is given in attached communications.

It should also be added that the plants supplying power to the pneumatic tubes of the postal system located in the United States post-office building, New York, and United States post-office building, Brooklyn, are under my direction.

ALFRED BROOKS FRY.

You asked me also, Mr. Chairman, to prepare a memorandum of what I thought might be the outline and principles to be followed in making an investigation of this subject, and I have prepared such a memorandum.

The CHAIRMAN. I wish you would kindly explain the matter briefly to the commission.

Mr. FRY. This is a memorandum which I prepared concerning the proposed report on systems of pneumatic-tube transmission for mail matter in the cities of St. Louis, Chicago, Philadelphia, New York, and Boston. It may be proper for me to say that in connection with my work for the Treasury Department, and chiefly in relation to United States public buildings, I have naturally had a great deal of experience with regard to tubes, since we in many cases generate the power used by them; and I have also been a member of both commissions designated by the Postmaster General to investigate the subject.

The memorandum referred to by Mr. Fry is as follows:

MEMORANDA CONCERNING PROPOSED REPORT ON SYSTEMS OF PNEUMATIC-TUBE TRANSMISSION FOR MAIL MATTER IN THE CITIES OF ST. LOUIS, CHICAGO, PHILADELPHIA, NEW YORK, AND BOSTON.

It is assumed that the practical value of the pneumatic mail tubes is no longer debatable, and granting this the matter would seem to divide itself into three heads:

(1) A history and description of the systems that have been installed and are in present use for purpose named in said cities, together with a statement as to the probable cost of installation of said systems.

(2) A report on the present going condition of systems referred to in the cities named, i. e., as to their general physical condition and mechanical efficiency.

(3) Estimates as to cost of duplication of these present systems in use by the Post Office Department in aforesaid cities, coupled with, if desirable, a statement of probable costs of such additions as the post-office authorities may believe essential.

(1) *History and description of the tube systems.*—With reference to the time, expense, etc., of making reports named, it may be remarked that the history and description of the present systems can be prepared without much difficulty. It is largely a matter of compilation, using as a basis the report of the Postmaster General to Congress made January 4, 1901, also report prepared under direction of the Postmaster General in 1908. Moreover, information can doubtless be obtained from the American Pneumatic Service Co., which, as I understand it, took over most, if not all, of the various independent companies that originally installed these tubes; from the postmasters in the larger cities; and I have considerable miscellaneous data in my own office.

The compilation could be well made while the information to be sought under heads Nos. 2 and 3 was being obtained and tabulated; but it would seem that in view of what is already in the various printed records the commission would desire to brief this history or description as much as practicable.

As regards original construction costs, it would be difficult at this late day to analyze many of them, though it would not be very difficult to form a judgment as to whether various alleged amounts were or were not padded by applying common sense and experience in similar work in various cities where said tubes were installed.

It must always be borne in mind that in doing work in or under the streets of the larger American cities there are always expenses involved that are difficult to tabulate or in many cases even to record as items; such as gratuities paid abutters or for extra inspection service and the like; and it is known that in some cases these costs have been exceedingly heavy. Besides, it must be remembered that the earlier pneumatic tube lines were more or less experimental and doubtless much money was spent in apparatus or construction that was afterwards replaced. Hence, claims as to original construction costs, however interesting, have chiefly what may be termed a moral value. The cost, if any, of municipal franchises will have to be considered separately in each case.

(2) *Present operating and physical condition of tube systems.*—I believe a report on the present going condition of the tube systems referred to in the cities named could be prepared in, say, about two weeks, unless it is desired to make an examination of the condition of the underground tubes themselves. Given the adequate help of experienced machinists and engineers and working without regard to hours and during a period of the time simultaneously in the cities heretofore named, a careful examination could be made of the power generating apparatus, of the receiving and transmitting systems, of the condition of the carriers; and perhaps time would allow the taking out for examination and subsequent replacement in the tube line of one or more bends in each line that naturally receive the greatest wear. At the same time there could also be made an examination of any trap and drip systems where failures are likely to cause trouble.

A physical examination of all the tube lines would, of course, be very difficult, especially at this season of the year, in any of the northern or western cities. Many municipalities will not permit street excavations during the winter and early spring months, and heavy frosts or heavy snowstorms would

obviously block this work, especially as it would have to be undertaken with the cooperation of the post-office authorities, and any undue interruption to regular use of pneumatic-tube systems would have to be avoided.

I do think, if time and season permitted, it would be desirable to take out for observation some of the sections of the older tubes, notably, let us say, in Philadelphia, Boston, or New York; but writing very frankly it seems to me that any general physical examination of these tube lines would be impracticable. For the most part it would mean digging trenches, similar to those required for new construction work, in busy streets, often passing through the heart of our largest cities. And there would be no particular guaranty that because 100 feet of any given line was absolutely sound the next 100 feet would be in the same condition. Whether we like it or not, again writing frankly, it seems to me we have got to be guided in our opinion as to the condition of these underground tubes by the appearance of such samples as it may be practicable to remove and inspect. The records of the street departments in the cities concerned should show any excavation that has been performed since tubes were laid for the purpose of installing new piping conduits, subsequent structures, etc., near said post-office tubes. Inquiry would indicate whether or no the pneumatic tubes had probably been injured or disturbed; and the records of the various post offices would indicate whether or no there had been troubles due to tube stoppages, and, if so, the cause and duration of same; and finally, the light of experience and common sense would aid in determining tube condition. For example, if one were buying a going waterworks plant, and found on investigation that water takers made no complaints of insufficient quantities; that there appeared to be no settlements in street surfaces from leakage, and that there was a reasonably close agreement between the water pumped and the estimated or recorded water used, one could, I think, fairly assume that the underground service system of such a water company was tight and in good condition, especially if age and character of construction were known. With my present light, it seems to me that, having exhausted the sources of information that I have inferred, we must largely assume the condition of the underground pneumatic tubes.

Given freedom from electrolytic action, chemical attack, or mechanical injury, we know that cast-iron pipe, with the original skin unbroken on the outside and properly coated, lasts many years. Owing to the presence of more or less moisture, quantities of vaseline and grease used for lubrication, and the fact that most of the wear is taken up on the gaskets or packing rings of the pneumatic carriers, the normal internal wear in the tubes should not be great. Where we have examined the customhouse appraisers' warehouse tube in New York, said wear has been minute.

It is, of course, true that where mains have been laid in soil saturated with salt water or been exposed to the possibility of settlement, electrolysis, or even undue internal wear, consideration should be given to attendant circumstances. But beyond what I have outlined under this head, i. e., tube-line inspection, I do not feel that we can profitably go, even if a large sum of money and an indefinite period of time were at our disposal.

(3) *Estimates of cost of duplications and extensions.*—Estimates of the cost of duplication of the various systems can, I believe, be made up within 30 days, given, always, sufficient competent engineering assistance. These estimates can be based to some extent at least upon estimates that have been previously prepared by the pneumatic tube companies and by the post-office officials, checked by independent judgment and experience, and by inquiry of municipal officials and local engineers as to cost of street excavation, back filling, replacement of pavements or other surfaces, etc., and taking as our guide contracts that have been recently performed. In practically every city now there are good systems of cost-keeping and ample records of the expense of performance of work similar to the character we are considering, both by public officials and private parties.

For the transmitting and receiving apparatus I presume we should have to depend upon the properly checked estimates of the inventors and manufacturers of same. The cost of the units for furnishing the pneumatic power, whether in the shape of blowers, steam or engine driven, can be easily determined.

The cost of the cast-iron pipe which enters into the tube-line construction is a matter of daily public record, and the costs of boring and laying are not mysteries.

As regards the cost of any proposed extensions I should get a description of those the post-office authorities deem wise, and, applying common sense, experience, and knowledge obtainable locally, proceed to estimate the cost of proposed extensions in the same way we would the duplication of original lines.

The CHAIRMAN. How long do you figure, Mr. Fry, that it would take to file a report of the nature you refer to?

Mr. FRY. According to the extent that you deem it expedient or desirable to go into the physical condition of the tubes themselves. To make an inspection of a few samples for each line of the physical condition of the operating apparatus, the carriers, and the receiving and dispatching apparatus, I would work simultaneously in all the cities. That, I believe, can be done in two weeks. To determine the cost of duplicating the lines would require a somewhat longer period. There is a mass of information available, but it has to be gotten from various sources and brought together.

The CHAIRMAN. You said that you might require some assistance. Can you give the commission the number of people required and the expense that would be involved?

Mr. FRY. I estimated that I should put one man on the work in Boston, and I should put another man on the work in Philadelphia. I should associate with myself one man in New York. In St. Louis I should start a man who has previously worked for me, and I should communicate with some engineer in Chicago—Mr. Cooley, if I could get hold of him—and start him there. Then I would take up the situation in New York, and if I found it deficient I would have some additional work done there if necessary. I would then myself proceed to St. Louis and Chicago and go over the information obtained there.

The CHAIRMAN. These parties whom you might employ would have no connection, would they, with these going concerns?

Mr. FRY. No; they would have no connection with them whatever. As a matter of fact, three of them are already in the Government service. They are men who have had no leave of absence this year, and I am quite sure I could obtain leave for them without pay.

Senator SMITH. What do you think the entire investigation will cost us?

Mr. FRY. Somewhere between three and four thousand dollars.

The CHAIRMAN. Including your own commission?

Mr. FRY. Yes, sir.

The CHAIRMAN. How much would the men get per day?

Mr. FRY. From twenty to twenty-five dollars per day. They will have to lose their Government salary while they are doing this work, and, of course, that does not seem fair.

The matter of using a larger tube than an 8-inch tube presents a considerable number of difficulties, if the transmission is to be not trolley or little subway transmission but is to be tube transmission. Obviously, in many of these narrow streets the ability to get in a tube of considerable diameter becomes questionable. In other instances the necessity of turning corners in narrow streets more or less sharply becomes a very difficult proposition.

Senator SMITH. The larger material you are passing through the tube the larger your curve has to be?

Mr. FRY. Yes, sir. Then the handling of the very heavy carrier becomes a matter of serious physical difficulty and it greatly slows the operation of the tube. The American Pneumatic Service Co. put in a 10-inch tube a number of years ago in Boston, using a type

of wheel carrier, and I understand that tube has never been a commercial success. The practical difficulties they encountered in their operation nullified the advantages that theoretically the larger carriers got. There is considerable information on that subject in the previous reports. Our original commission went into that matter very fully and examined systems that used a tube as large as 24 inches. I think if you are going to undertake the operation of tubes of that size that it has got to be approached more in the line of the Chicago little subways, which, as you know, were not commercially successful.

Senator SMITH. You think that the present 8-inch tube which we have in New York is probably as feasible as a larger tube?

Mr. FRY. I regret to say that from my present knowledge I am disposed to think so. I consider that it is possible that a 10-inch tube might be installed, but the cost of construction would be considerably increased, the cost of maintenance would probably be considerably increased, and there would remain always this matter of the difficulty in getting into given buildings and around given points. I doubt if even you gentlemen, with the very great fund of general information that you get in Congress, are aware of the increasing structural difficulties of carrying work through the streets in large cities. In this country it is rendered additionally difficult by the fact that practically no city, except possibly Philadelphia, has any maps that are worth very much. Of course we have tried to contribute to that knowledge as far as we can. There is a map that was prepared in my own office after we finished the construction of the appraisers' warehouse tube, and that shows not only the plan but the grade of the tubes and the position of the manholes.

Mr. Fry also submitted to the commission a copy of a specification for double pneumatic-tube service constructed in 1910 between the United States customhouse and the United States appraiser's warehouse in New York City, the said system being the property of the United States; a plan showing the location of the tubes of said system; certain data concerning same; a copy of a letter from the supervising chief engineer, United States public buildings, New York, addressed to the Supervising Architect, Treasury Department, under date of June 4, 1912, transmitting letters from the appraiser of the port and the office of the collector of the port as to the usefulness of said system; and also a memorandum giving recent contract prices paid by a private engineering firm in New York for certain trench work in the streets of the Borough of Manhattan; all of which are as follows:

[Treasury Department. Office of the Supervising Architect.]

SPECIFICATION AND PROPOSAL SHEET FOR DOUBLE PNEUMATIC-TUBE SERVICE BETWEEN THE UNITED STATES CUSTOMHOUSE AND UNITED STATES APPRAISERS' WAREHOUSE, NEW YORK CITY, N. Y.

TREASURY DEPARTMENT,
OFFICE OF THE SUPERVISING ARCHITECT,
Washington, D. C., January 26, 1910.

Sealed proposals will be received at this office until 3 o'clock p. m. on the 23d day of February, 1910, then opened, for the installation of a double pneumatic-tube service between the United States customhouse and the United States

appraisers' warehouse, New York, N. Y., in accordance with drawings and specification, copies of which may be had at this office or at the office of the chief engineer and superintendent United States public buildings, New York City, N. Y., at the discretion of the Supervising Architect.

JAMES KNOX TAYLOR,
Supervising Architect.

L. A. S. N. S. T.
J. E. P. G. E. R.

N. B.—Bidders are required to return the drawings and specifications without marks, notes, or other mutilations thereon.

The Government frank sent to intending bidders is to be used for the return of the drawings and specifications, and for no other purpose.

SPECIFICATION FOR DOUBLE PNEUMATIC-TUBE SERVICE BETWEEN THE UNITED STATES CUSTOMHOUSE AND THE UNITED STATES APPRAISERS' WAREHOUSE, NEW YORK CITY, N. Y.

TREASURY DEPARTMENT,
OFFICE OF THE SUPERVISING ARCHITECT.

GENERAL CONDITIONS.

1. *Form of proposal and signature.*—Proposal must be made on the blank form hereto attached, inclosed in sealed envelope, marked proposal with title of building as given above, and addressed to the Supervising Architect, stating in writing and figures (without interlineation, alteration, or erasure) the sum of money for which the bidder proposes to supply the materials and perform the work required by the drawings and this specification and the time within which he proposes to complete the work and the unit prices called for in proposal sheet. The proposal must be signed with the full name and address of the bidder; if a copartnership, the copartnership name by a member of the firm, with the names and addresses in full of each member; and if a corporation, by an officer in the corporate name, with the corporate seal attached to such signature. No telegraphic proposals or telegraphic modifications of proposals will be considered. Proposals received after the time advertised for the opening will be return unopened. If proposal is sent by registered mail, allowance should be made for the additional time required for such transmission.

2. *Certified check.*—Each bidder must submit with his proposal a certified check, in a sum equal to 10 per cent of the amount of such proposal, drawn to the order of the Treasurer of the United States, and the proceeds of said check shall become the property of the United States, if for any reason whatever the bidder after the opening of the bids withdraws from the competition or refuses to execute the contract and bond required in the event of said contract being awarded to him. Copy of contract and bond will be furnished the contractor after the approval of his bond. Bidders are expressly notified that the checks of the two lowest bidders will be held uncollected and at their risk until the bond required shall have been approved by the Secretary of the Treasury.

3. *Subcontractors.*—No subcontractor or other person furnishing material or labor to the contractor will be recognized, nor will this department be responsible in any way for the claims of such persons beyond taking a bond, as required by the act of Congress approved August 13, 1894, which provides in substance that when a *formal* contract is let for the erection or repair of a public building, etc., the contractor before commencing such work shall furnish the usual penal bond, with good and sufficient sureties, with the additional obligation that such contractor will make prompt payment to all persons furnishing him labor or materials used in the prosecution of the work. Persons so furnishing materials or labor have a right of action on said bond in the name of the United States for their use. No formal contract is usually let, however, and no bond taken where the amount involved is less than \$2,000.

4. *Parties in interest.*—No Member of or Delegate to Congress and no officer of the Treasury Department, superintendent, inspector, clerk, employee, or other person in any manner connected with the office of the Supervising Architect shall be interested, either directly or indirectly, in the contract or work herein provided for or be entitled to any benefit derived therefrom, and any violation of this understanding shall work a forfeiture of all moneys which may become due to the successful bidder.

5. *Rights reserved.*—The material proposed to be used, time for completion of work, and the competency and responsibility of bidders will receive consideration before award of contract.

The Treasury Department reserves the right to accept any part or parts of the proposal made at the prices included in same; also to waive any informalities in and to reject any and all proposals and to require the contractor to discontinue the services of any workman employed on the work who is unskillful or otherwise objectionable.

6. *Form of contract.*—The contract which the bidder agrees to enter into shall be in the form adopted and in use in the Office of the Supervising Architect, blank forms of which can be inspected at said office and will be furnished upon request being made to parties proposing to submit bids. In case of the abrogation of the contract, whether by reason of the default of the contractor, his bankruptcy, or other cause, the Supervising Architect, acting for both parties, shall have the right to determine the valuation of all work performed and all materials furnished in place in connection with the contract and of all material, machinery, tools, etc., upon the site of the building taken possession of by the Government, and his decision shall be final.

7. *Modifications.*—The department reserves the right to make any additions to, omissions from, or changes in, or substitutions for the work or material called for by the drawings and specification without notice to the surety or sureties on the bond given to secure satisfactory compliance with the terms of the contract; and the department further reserves the right to demand additional security when additions are made, if in its judgment such security is required. The unit prices called for in the proposal sheet shall be used as the basis of value of such additions, omissions, or changes, if they are deemed reasonable by the Supervising Architect. If deemed unreasonable, or if none applicable are required or given, and no agreement can be reached by the Supervising Architect and the contractor as to the reasonable value of the work, then the Supervising Architect shall have the right to fix the value of such additions, omissions, or changes, and no claim for damages on account of such change or for anticipated profits shall be allowed.

8. *Delays.*—Each bidder must submit his proposal with the distinct understanding that, in case of its acceptance, time for the completion of the work shall be considered as of the essence of the contract and that for the cost of all extra inspection, and for all amounts paid for rents, salaries of contingent force, and other expenses entailed upon the Government by delay in completing the contract, the United States shall be entitled to the fixed sum of twenty-five dollars (\$25) as liquidated damages, computed, estimated, and agreed upon, for each and every day's delay not caused by the United States; provided, however, that the collection of said sum may, in the discretion of the Secretary, be waived in whole or in part; and that the contractor is to be entitled to one day, in addition to said stipulated time, for each day's delay that may be caused by the Government, provided that a written claim therefor is presented by the contractor within ten days of the occurrence of such delays; provided further, that no claims shall be made or allowed to the contractor for any damages which may arise out of any delay caused by the United States.

The department, acting for the United States, reserves the right to suspend any portion of the work embraced in the contract whenever, in its opinion, it would be inexpedient to carry on said work.

NOTICE TO SURETIES.

9. The attention of the sureties is particularly directed to the following conditions:

The final inspection and acceptance of the work shown by the drawings and specifications forming a part of the contract shall not be binding or conclusive upon the United States if it shall subsequently appear that the contractor has willfully or fraudulently or through collusion with the representative of this department in charge of the work supplied inferior materials or workmanship, or has departed from the terms of his contract. In any such case the United States shall have the right, notwithstanding such final acceptance and payment, to cause the work to be properly performed and satisfactory material supplied to such extent as in the opinion of the Supervising Architect may be necessary to finish the work in accordance with the drawings and specifications therefor at the cost and expense of the con-

tractor and the sureties on his bond, and shall have the right to recover against the contractor and his sureties the cost of such work, together with such other damages as the United States may suffer because of the default of the contractor in the premises, the same as though such acceptance and final payment had not been made.

Attention is called to section 21 of the act approved June 6, 1902, which provides as follows:

"That in all contracts entered into with the United States, after the date of the approval of this act, for the construction or repair of any public building or public work under the control of the Treasury Department, a stipulation shall be inserted for liquidated damages for delay; and the Secretary of the Treasury is hereby authorized and empowered to remit the whole or any part of such damages as in his discretion may be just and equitable; and in all suits hereafter commenced on any such contracts or on any bond in connection therewith it shall not be necessary for the United States, whether plaintiff or defendant, to prove actual or specific damages sustained by the Government by reason of delays, but such stipulation for liquidated damages shall be conclusive and binding upon all parties."

10. *Eight-hour law.*—The attention of bidders is called to the act of Congress approved August 1, 1892, limiting the hours of daily service of laborers and mechanics employed upon public works of the United States to eight hours in any one calendar day.

Attention is directed to the following executive orders:

Executive Order No. 1.

"11. Whereas by an act of Congress which received executive approval on February 23, 1887, all officers or agents of the United States were, as a matter of public policy, forbidden, under appropriate penalties, to hire or contract out the labor of any criminal who might thereafter be confined in any prison, jail, or other place of incarceration for the violation of any laws of the Government of the United States of America.

"It is hereby ordered that all contracts which shall thereafter be entered into by officers or agents of the United States involving the employment of labor in the States composing the Union, or the Territories of the United States contiguous thereto, shall, unless otherwise provided by law, contain a stipulation forbidding, in the performance of such contracts, the employment of persons undergoing sentences of imprisonment at hard labor which have been imposed by courts of the several States, Territories, or municipalities having criminal jurisdiction.

Executive Order No. 2.

"I. All departments of the Government under the supervision of which public works are being constructed are hereby directed to notify the representatives stationed at such public works to report at once to their respective departments all cases in which contractors or subcontractors on works now under construction have required or permitted laborers or mechanics in their employ to work over eight hours in any one calendar day.

"II. All Government representatives in charge of construction of public works are further directed that it is a part of their duty to report to their respective departments each and every case in which laborers or mechanics are required or permitted to work over eight hours a day on the works under supervision of such Government representatives. Wherever reports showing work in excess of eight hours a day are received by any department they are to be referred to the Department of Justice for appropriate action.

"III. All departments of the Government under the supervision of which public works are being constructed by contract are further directed to have their respective legal officers prepare and forward to the President a list of such statutes and Executive orders as have a direct bearing on contracts for the construction of public works, and with which bidders on such works should be made acquainted."

12. *Proposals.*—Proposals as hereinbefore called for must be based on pneumatic tube system drawings Nos. P. T. 1 and P. T. 2 and the specification, and must include everything necessary to complete the work in every detail.

The specification and the drawings are to be interpreted together and all work drawn, but not specified, or specified and not drawn, or not included in

either, but necessary to the satisfactory completion of the pneumatic-tube system, must be included in the proposal. No interpretation of the drawings and specification will be made prior to the award of the contract.

13. *Visit the buildings, streets, and other localities.*—Bidders must visit the buildings, streets, and other localities, compare the drawings and specification, and examine the structures, sewers, electric conduits, water piping, etc., in place; inform themselves as to all the conditions under which the work shall be installed, and include in their proposals all the items of labor and materials mentioned, shown, or necessarily implied, that may be required in the full intent and meaning of the drawings and specification, whether each item be separately mentioned or not. Information relative to existing structures adjacent to, on, or beneath streets and other locations where proposed pneumatic tubes and conduit are to be run can be obtained at the offices of the president of the Borough of Manhattan, bureau of sewers, the office of the commissioner of water supply, gas, and electricity, or from the Consolidated Gas Company, or other gas companies; the New York Edison Company, or other electric companies; the New York Steam Company; and the various surface, subway, and tunnel transportation companies. No extra compensation will be allowed for the neglect or oversight on the part of the bidder to thoroughly inform himself of all the conditions that may exist along the proposed line of tubes.

14. *Measurements.*—The scale proportions given on the drawings are in accordance with the general plans, but as variations therefrom may be found the contractor must make all of his own measurements, surveys, etc., and he will be held responsible for the proper fitting of his work. He must check and verify the drawings, and will be held responsible for any errors which could have been avoided by such checking.

The attention of bidders is specifically called to the various structures, conduits, piping, etc., as well as to the sewers, that will be encountered in construction of work covered by these specifications.

The matter of noninterference with the sewerage system of the city of New York requires special consideration because of the number of sewers crossing practically at right angles the proposed and necessary line for pneumatic tubes required by these specifications.

The following table gives the distance between the top of the sewers and the street surface over same serving streets crossing or intersecting West Street between Battery Place and Christopher Street.

Especial attention is called to the fact that the Government assumes no responsibility for the following dimensions, as same are for guidance of bidders, and dimensions must be checked by them:

Washington Street, from Battery Place to Christopher Street.

	Feet.		Feet.
Battery Place	4.8	Harrison Street	6.6
Morris Street	3.0	Franklin Street	7.6
Rector Street	3.7	North Moore Street	6.5
Carlisle Street	2.5	Beach Street	5.4
Albany Street	4.5	Hubert Street	5.7
Cedar Street	4.2	Laight Street	6.5
Liberty Street	3.5	Vestry Street	4.4
Cortlandt Street	3.0	Desbrosses Street	4.7
Dey Street	2.3	Watts Street	6.9
Fulton Street	3.2	Canal Street	1.2
Vesey Street	2.0	Spring Street	No sewers.
Barclay Street	2.0	Charlton Street	4.0
Park Place	4.0	King Street	5.5
Murray Street	3.2	Houston Street	4.7
Warren Street	2.6	Clarkson Street	4.4
Chambers Street	2.0	Leroy Street	6.9
Reade Street	4.0	Morton Street	6.4
Duane Street	8.5	Barrow Street	6.5
Jay Street	6.3	Christopher Street	8.5

15. *Time to complete.*—Bidders must state in their proposal the date (month, day, and year) when they will have the work completed. In naming the time for the completion of the entire work, an allowance of ten days must be made for the award of the contract, with a further allowance of ten days for the approval of the bond.

16. *Allowance for delays by the Government.*—Should the award of the contract be delayed beyond the ten days allowed, the date named by the bidder will be correspondingly advanced by this office. Should conditions arise which would cause the work under this contract to be stopped, or should the Supervising Architect suspend the work for any cause for which the contractor is not responsible, allowance for such delays shall be made in accordance with paragraph "Delays" of this specification.

17. *Time and manner of performing the work.*—The contractor must consult with the chief engineer and superintendent of public buildings (under whose charge the installation of the system will be) immediately on the award of the contract, as to the time and manner of performing the work, which must be prosecuted at such times and in such a manner as to interfere as little as possible with the service in the building, and the use of the streets, sewers, gas, electric service, heating service, transportation companies, etc., and to insure the operation of the plants in both buildings at all times.

Any work required to be done after regular working hours, on Sundays or legal holidays, must be performed without additional expense to the Government.

In this connection the attention of bidders is called to the following excerpts from the form of agreement between the city of New York and the U. S. Treasury Department, under which a franchise has been obtained for the laying of two pneumatic tubes and one tube for signaling wires in connection therewith, as covered by this specification, and the successful bidder will be required to comply with the same so far as his work is concerned.

18. *Liability for costs.*—The contractor shall pay the entire cost of:

(Paragraph 5 b.) "The protection of all surface and subsurface structures which shall in any way be disturbed by the construction of the tubes."

(c) "All changes in sewers or other subsurface structures made necessary by the construction of the tubes, including the laying or relaying of the pipes, conduits, sewers, or other structures."

(d) "The replacing or restoring of the pavement or other surface which may be disturbed during the construction of said tubes."

(e) "The ordinary inspection of all work during the construction * * * of the tubes as herein provided, which may be required by the president of the Borough of Manhattan, the commissioner of water supply, gas, and electricity, and the commissioner of parks."

Permits and drawings.—(Paragraph 6.) "Before the construction shall be begun the contractor shall obtain permits to do the work from the president of the Borough of Manhattan, from the commissioner of water supply, gas, and electricity, and the commissioner of parks. The contractor shall perform all the duties which may be imposed upon him by these officials as conditions of such permits, provided such conditions are not inconsistent with the provisions of this contract.

"The contractor shall submit to these officials working plans which shall include and show in detail the method of construction of such tubes, and the mode of protection or change in all subsurface structures required by the construction of the tubes. For the purpose of obtaining data upon which to base such working plans, the contractor shall, before starting any work under this resolution, and in order to properly locate the subsurface structures, make test pits where required, under the direction of the above-named municipal authorities."

[NOTE.—The drawings (which must be in quadruplicate) above called for must be submitted through the Supervising Architect.]

Liability for damages.—(Paragraph 10). "The contractor shall assume and become liable for all damages to persons or property, including the street and subsurface structures therein, by reason of the construction of said tubes, said liability to be fully covered by the bond of said contractor, and it is a condition of this consent that neither the city of New York" [nor the United States] "assumes any liability to either person or property for any damages caused by the construction of said tubes."

Time that trenches may remain open.—(Paragraph 12.) * * *. "No. street or other public place which shall be opened for the purpose of this construction or for any repairs subsequent to the completion of such construction shall be kept open for a longer period than fourteen (14) days on any one block."

Notice to municipal authorities.—(Paragraph 14.) The contractor shall give notice [through the chief engineer and superintendent of repairs] to the president of the Borough of Manhattan, the commissioner of water supply, gas, and electricity, and the commissioner of park, in writing, of his intention to begin

the construction of the work hereby authorized, at least forty-eight hours before such construction commences."

(Paragraph 15.) "Where the municipal authorities shall so direct no subsurface structure shall be removed, relocated, or otherwise disturbed by the construction of these tubes, and such tubes shall be constructed over, under, or around such subsurface structures in such a manner as shall be consented to or prescribed by said municipal authorities. If at any time unforeseen obstacles shall be encountered, the contractor shall immediately notify the municipal authorities herein referred to, viz, the president of the Borough of Manhattan and the commissioner of water supply, gas, and electricity [through the chief engineer and superintendent of public buildings], and, where a public park or other property under his jurisdiction is affected, the commissioner of parks; and any decision which said authorities shall come to in regard to such matter and any direction which shall be made as to the course to be pursued, shall be adhered to and carried out by the contractor."

Definition of the words "tube" or "tubes."—(Paragraph 17.) "The words 'tube' or 'tubes' in this resolution shall be deemed to and shall include the manholes, underground supports, and drainage system for such tubes as herein authorized."

19. *Kind and quality of material.*—All materials and appliances furnished must be in strict accordance with the specification requirement in each case and of the best quality and grade.

Bidders must furnish on the proposal sheet the information required thereby, as to name and address of manufacturers and catalogue number or trade name of appliances and materials they propose to supply, and where required by proposal sheet they must give the names of *three different manufacturers* of the material, appliance, or fixture. The department reserves the right to select any one of the makes named, which selection is without prejudice to goods of other manufacturers named, and must not be otherwise construed.

It is the intention of this office to install a pneumatic-tube service and accessories which are the result of the best experience in this line of work, and in the consideration of proposals preference will be given, other things being approximately equal, to the proposal of bidders who have had the requisite experience.

Each bidder shall name in the proposal sheet where he has such apparatus as called for in operation, and for how long.

Consideration will not be given to proposals from bidders who have not had their apparatus in continuous operation by bona fide users for at least one year previous to the date of this specification.

In the event the successful bidder fails to comply with any of the requirements of the proposal sheet and relative to appliances and material, i. e.—

(1) Fails to fill out the proposal sheet with names of manufacturers, etc., of material, etc., which he desires to use in the work;

(2) Fails to give the names of *three different manufacturers* where required on proposal sheet, even if the one or two makes comply with the specification;

(3) Names materials, appliances, or fixtures not strictly in accordance with specification requirements in regard thereto, or which are not of best quality and grade—the Supervising Architect reserves the right to reject any or all the materials, apparatus, and fixtures named by said bidder and to select those to be used in the work; which selection shall be final and binding upon the contractor, who must install for the proposal price the appliances, materials, and fixtures so selected.

20. *Approval of material, etc.*—The approval by the department of any material, appliance, or fixture named on the proposal sheet is to be understood as an approval of same only upon its conformity with the specification requirements in regard thereto, and not as an absolute acceptance of the article.

21. *Samples.*—The contractor must furnish, for the approval of the Supervising Architect, all the samples hereinafter called for, and also, if required by the Supervising Architect, samples of all or any of the appliances, materials, and fixtures he proposes to use, and must pay all shipping charges on samples. No materials, appliances, or fixtures of which samples are required to be submitted for approval will be permitted to be placed in the buildings or in the trenches between the same until such approval has been given by the Supervising Architect.

Samples must be accompanied by a letter of transmittal from the contractor and each sample must be marked with the name of the contractor and the name of the building or buildings to which it relates. Approved samples, if prop-

erly tagged for identification, may be used in the work after serving their purpose as samples. Rejected samples of value will be returned to the contractor by express at his expense.

22. *Patents.*—The department will not recognize demands brought on account of infringement of patents, but will hold the contractor and his bondsmen strictly responsible for any delay or any cost resulting from his failure to protect the Government fully against patent rights.

23. *Permits, etc.*—The contractor must obtain all permits, pay all fees and charges and municipal inspection fees, and comply with the rules and regulations of the city in regard to excavations, etc., and must comply with all the local regulations in regard to street excavations and repairs.

24. *Protection of work and materials.*—The contractor must obtain at his expense all the necessary policies of insurance on work and material supplied by him, as the same will be at his risk until final completion, inspection, and acceptance.

25. *Tools, etc.*—All tools and appliances required for the proper execution of the work must be provided by this contractor, and maintained, stored, repaired, and removed at his sole charge and risk.

26. *Excavations.*—The contractor to make all necessary excavations for work in this contract in an approved manner. All earth, etc., taken out to be removed from the streets and premises, except what is needed for back filling.

27. *Cutting and drilling.*—All required cutting and drilling of masonry, steel, ironwork, etc., of structures affected by this work must be done by this contractor, and all disturbed construction or finish must be made good, but under no conditions must structural work be cut, except upon the approval of the chief engineer and superintendent of public buildings, or other authorized representative of his office.

28. *Structural difficulties.*—Should any structural difficulties prevent the installation of work, etc., as indicated on the plans, slight deviation therefrom may be made upon the written approval of the chief engineer and superintendent of public buildings. Changes of magnitude and all those involving deductions or extras must have the written approval of the Supervising Architect before being made.

29. *Cleaning up.*—As the chief engineer and superintendent of public buildings may direct, both during the progress of the work and upon completion of same under this contract, the contractor will be required to clean up in and around the buildings or streets where his work has been performed and remove from the premises all rubbish and débris caused by the work under this contract.

30. *Protection and damage.*—All work contemplated in this specification and all work in connection therewith must be properly protected.

The contractor will be held responsible for and be required to make good at his own expense all damage caused by his workmen, during the execution of the contract, to work, materials in place or on the premises, or included in this contract.

31. *Tests and inspections.*—At such times as hereinafter specified the Supervising Architect will cause such tests or inspections of the installation or appliances to be made as may be considered necessary.

The contractor shall make said tests at his own expense, unless otherwise noted, in the presence of the department's authorized agent, who shall determine the test conditions; the contractor shall give written notice to the Supervising Architect, through the chief engineer and superintendent of public buildings, of his readiness for inspection and test.

Should the inspection or test not be begun, through no fault of the contractor, within ten (10) days of receipt of notice by the Supervising Architect, allowance will be made as hereinafter provided.

Should the inspection or test be delayed upon the arrival of the inspector, or require repetition for any reason for which the contractor is responsible, the cost of delayed or subsequent inspections and tests, including the salary, traveling and other expenses of the inspector or inspectors, shall be at the expense of the contractor and be deducted from any money due him upon the contract.

In all questions as to the interpretation of the drawings and specifications, the satisfactory completion of the work, and the defects necessary to be remedied, the decision of the Supervising Architect shall be final and binding upon the contractor.

In the event the contractor does not within a reasonable time remedy all defects and make all changes demanded by the Supervising Architect to complete

the work satisfactorily, the right is reserved to have defects remedied or changes made and to charge the cost of same against the account of the contractor.

32. *Payments.*—Payments will be made monthly, if desired by the contractor, on account of the work satisfactorily in place in the buildings or streets, based on the estimated value thereof, as ascertained by the Supervising Architect, less 25 per cent of such estimate, which will be retained until the final inspection and tests of all materials and work embraced in the contract, after which time final payment of the balance will be made.

33. *Guarantee.*—The bond which will be required in connection with the contract must guarantee each and every part of the work thereunder as well as properly safeguard the interests of the city of New York, the United States Government, and the interests of all parties affected by this work. The contractor will be required to remedy at his own expense all defects which may develop by reason of the use of any inferior or defective materials or workmanship, and make good all damage done persons or property which may be caused by this work. It must also be understood and agreed that the final acceptance and payment for the work will not relieve the contractor for having installed defective materials and work not apparent at time of final inspection.

34. *Description of work.*—This specification contemplates the installation of a complete double pneumatic-tube service between the buildings named on route shown on drawings, and the work done under this contract will include the furnishing and laying of the pipe lines or "tubes," furnishing and placing the transmitting and receiving apparatus at each station, furnishing and placing the air compressors or blowers with their motors, furnishing and placing the necessary tanks, piping, etc., in connection with the compressors and tubes, preparing the entrance for the tubes into the buildings, furnishing and erecting the necessary electric wiring, etc., all as more fully hereinafter described and specified.

35. *Pneumatic tubes.*—The pipe used for the straight runs of the "tubes" shall be cast-iron hub (or bell-and-spigot) water pipe, of nominal diameter of 8 inches and nominal lengths of 12 feet, and must weigh approximately 60 pounds per linear foot before being bored, with an allowable variation of 4 per cent either way. Any length weighing less than the lower limit will be rejected.

36. *Material.*—The material used in making the pipes shall be first-class quality of gray iron adapted for the purpose, the metal to be without admixture of cinder or inferior metal of any sort, and shall be of such character as will make sound, strong, tough, even-grained castings capable of being easily machined.

37. *Tests of material.*—Two specimen bars 30 inches long, 2 inches wide, and 1 inch thick shall be cast, one near the beginning, the other near the end of each heat from the same batch of metal that the pipes are cast from. The specimens must be stamped near one end with the initials of the maker's name, the year of casting, and the serial heat number with letters of suitable size. The bars shall be tested by being placed flatwise upon supports 24 inches apart and loaded at the center until broken. If the two bars representing any one heat, being sound and of the area of 2 square inches, shall be broken at this test by less than 1,900 pounds, the pipes cast at that heat shall be rejected. Should the dimensions of the test bars vary from those given above, a proper allowance will be made.

38. *Castings.*—The pipes shall be cast in dry-sand molds, in a vertical position, with the bell end up. No casting shall be taken from the molds until it is thoroughly cold. After the pipes are taken from the mold enough of the plain or spigot ends shall be cut off to free the pipes from the effects of the chill. The pipes shall be about 12 feet long after cutting, the ends square and true. Defective plain ends may be cut off, provided that in no case shall a length be shorter than 9 feet, not including the bell end; also that not more than 5 per cent of the whole number of pipes shall be less than 10 feet long, and not more than 10 per cent shall be less than 11 feet 6 inches long, exclusive of the bell end. Where the pipes are cut off the end must be left square and true.

The pipe castings shall be free from cold shuts, sand holes, hard spots, or serious defects of any description whatever. No plugging, burning in, or filling of any kind is to be done, and no lumps shall be left in the barrel or socket.

The lengths shall be rejected when inside diameter exceeds 8 inches. All bores shall be straight throughout, and eccentricity between the inner and outer diameter shall not exceed $\frac{1}{16}$ inch.

Each length shall have clearly cast on its outer surface the initials of the maker's name, etc., as specified for the test pieces, all letters on pipes to be not less than 2 inches long and $\frac{1}{8}$ inch in relief.

All lengths shall be thoroughly cleaned and freed from sand, scale, and rust, and must be approved in these respects before being dipped.

39. *Coating*.—After the pipes have been prepared they shall be coated on the outside with a coal-tar-pitch varnish that shall contain sufficient oil to make a smooth coating, tough and tenacious when cold, and not brittle or with any tendency to scale off.

Each length shall have a temperature of 300° F. at the time it is dipped. The temperature of the varnish shall also be at 300° , and shall be maintained at that temperature during the time the casting is immersed. Each casting shall remain in the bath at least five minutes.

40. *Hydrostatic test*.—When the coating has become hard each length shall be subjected to a hydrostatic test of not less than 200 pounds per square inch for a period of not less than three minutes, and, if required by the inspector, shall be subjected to a hammer test while under pressure. Any length not absolutely tight under this test shall be rejected.

41. *Bends*.—The bends must be made of material in all respects similar to that of which the straight lengths are cast. They shall be curved to a uniform radius of 8 feet to the center of the pipe, and made in short lengths, not longer than $22\frac{1}{2}^{\circ}$ (finished length), the ends flanged. The body of the bends to be $9\frac{1}{2}$ inches diameter outside, cored to bore $8\frac{3}{8}$ inches; the flanges cast $13\frac{1}{2}$ inches diameter by $1\frac{1}{8}$ inches thick. Bends may be made in shorter lengths than above designated, but must all be of same radius.

42. *Special fittings*.—All special fittings necessary to properly connect the tube lines shall be of material as above specified. All bends and specials shall be marked and coated as specified for tube lengths, but if cast at different foundry or at different heats specimen bars shall be cast, marked, and tested as above specified.

43. *Machining*.—All straight lengths of bell and spigot pipe shall be bored to $8\frac{1}{8}$ inches internal diameter, with not more than $\frac{1}{32}$ inch (inch each way) variation in parallelism in any length, and the finished bore shall be smooth without ridges or roughness of any sort.

The bell end of each length shall be counterbored, at least $\frac{1}{2}$ inch deep, as large in diameter as the spigot end of the adjoining length will allow, which shall be turned to fit, making the fit slightly taper, and to bottom in the counterbore. All connections and spigots must be made uniform in size. The bores of two adjoining lengths must be alike at the joints without any perceptible shoulder, the ends being reamed to size for that purpose if necessary before being placed in the trench.

The bends shall be ground to internal diameter of $8\frac{3}{8}$ inches, and unless otherwise needed for special locations the angle of the flange faces shall be machined to $22\frac{1}{2}^{\circ}$ to each other and the flanges drilled to template for eight $\frac{3}{4}$ -inch bolts and two dowel pins not less than $\frac{1}{16}$ inch diameter. The holes for the dowel pins shall be drilled to template also.

44. *Cones*.—Suitable straight connecting pieces called "cones" shall be 1 or 2 feet long, with one end flanged, the other having either a bell or a spigot end, as may be needed, must be furnished to make the connection between the bends and tangents (straight runs). The cones shall be bored taper from the bore of the tube to the bore of the bends, but the flanges must be faced at right angles to one side of the bore, and not at right angles to the axis of the bore. This is for the purpose of bringing the outer side of the tapered bore tangent to the outer curve of the bend. The flanges of the cones and the bell and spigot ends to be fitted as heretofore specified.

45. *Wedge piece or closures*.—Furnish suitable flanged castings called wedge pieces for insertion in the tube lines to gain access to the interior of the pipes, the removable piece being 26 inches long on center line. The flanges of the wedge piece shall be inclined 5° to the horizontal axis of pipe, or 10° to each other. Wedge pieces shall be made for either flanged or hub and spigot pipe. In lieu of wedge pieces, cast-iron closures of approved pattern may be used.

46. *Defects of pipes, etc.*—Sand holes, hard spots, or other defects of the interior surface of pipes or fittings developed during the process of machining, of a degree serious enough to interfere with the smoothness of the bore, shall be rejected.

Care shall be taken in handling the pipes, etc., not to injure the coating.

47. *Tests of tubes and fittings.*—All pipes, bends, etc., after being machined, shall be tested with 50 pounds air pressure. Any pipe or fittings showing leaks through body or flanges shall be rejected; but if leaks occur near spigot end of any pipe, such leaky portion may be cut off, provided that the remaining sound portion is not less than 5 feet long.

48. *Inspection and testing.*—Upon receipt by the Supervising Architect of advice from the contractor at what foundry the pipes and fittings will be cast or at what shop they will be machined and tested and when they will be ready, an inspector will be detailed to make the specified inspection and tests.

The right is reserved to omit the supervision by the department's inspector of the transverse test of the specimen bars and the hydrostatic and pneumatic tests hereinbefore prescribed, provided the contractor shall furnish a sworn statement that the conditions have been complied with and that the castings delivered are in accordance with the specified requirements.

In the event the Supervising Architect elects to have made the shop inspections hereinbefore noted, all pipe and fittings for the tube lines passed by the inspector shall be marked by him with a special mark provided for that purpose in such a place that the mark shall be visible when the tubes are laid in the trench. The weight of each length shall be conspicuously painted on outside.

49. *Interior coating.*—All machined pipe and fittings after having passed the specified inspection and tests must have the interior coated with approved rust-preventing coating of a lubricating nature, and before shipment the ends of the pipes and fittings must be capped, plugged, or otherwise prepared to prevent grit or dirt from getting into the bore while tubes are in transit.

50. *Wire conduit.*—The contractor shall also furnish the material for a wire conduit between the two buildings, to be laid in the same trench with the pneumatic tubes, which conduit shall be made of 4-inch cast iron, hub and spigot water pipe, in 12-foot lengths, $\frac{1}{2}$ inch thick, weighing approximately 22 pounds per foot. The bore of the pipe shall be free from lumps, fins, or roughness of any sort, and, to be acceptable, a mandrel 12 inches long and of diameter $\frac{3}{8}$ inch less than nominal diameter of the pipe shall pass freely through each length and section of bend.

The castings for the horizontal bends must be curved to a radius of 8 feet to center of pipe, but all other bends may be of lesser radius, but not less than 4 feet. The bends may be made in as many pieces or sections as desired, and both pipes and bends must bear the mark of the manufacturer.

The several lengths of pipes and bends for this work shall have the ends fitted, male and female, as specified for the joints of the 8-inch tubes.

The ends must be reamed or otherwise fitted so that there will be no shoulder or offset at the joints.

These pipes and bends must be coated on outside, as specified for the 8-inch pipes, but the inside shall be finished with a hard enamel finish similar to that used for coating the steel conduit used for the protection of electric wiring hereinafter specified.

Before the coating is applied the pipes and fittings must be subjected to a hydrostatic test of 200 pounds per square inch, and, to be acceptable, must be thoroughly tight. An affidavit of contractor that these pipes have successfully withstood the above test must be furnished the Supervising Architect.

51. *Alternate conduit.*—Each bidder will name in his proposal the sum to be added to or deducted from the lump sum of his bid for the use of fiber conduit in lieu of the cast-iron pipe above specified.

The conduit shall be of 4 inches internal diameter, $\frac{1}{2}$ inch thick; the bore to vary not more than $\frac{1}{8}$ inch from the true circle. The material shall be wood pulp or fiber, wrapped in thin films, upon a forming mandrel under pressure, thoroughly dried and saturated with preservative compound.

The sections shall be 5 feet in length with ends squared and threaded for couplings, the threads to be of the United States standard or half V type, four to the inch, cut far enough back, so that when the couplings are screwed up the ends of adjoining lengths shall butt. The couplings shall be not less than 4 inches long, $\frac{1}{2}$ inch thick, and threaded to fit the ends of the pipe snugly.

The interior of the pipe shall be free from obstructions, and the ends shall be reamed so there can be no offsets at the joints when put together.

Bends to be of radius as specified for cast-iron pipe, and parallelism, etc., shall be determined as specified for the iron pipe.

52. *Trenching.*—The office drawings show approximately a typical location of pipes and conduits in the streets and the proposed location of the tubes, but, in order to determine the exact location of the trench, the contractor shall dig test holes ahead of the trench enough in advance of the actual trenching as not to cause delay by reason of changes in line made necessary by the precise condition discovered by the test holes.

Earth and other matter removed shall be neatly heaped, so as to afford the least possible obstruction to traffic. All paving shall be carefully preserved and piled neatly along the side of the trench as required by New York City regulations.

Should it be required by the municipal authorities, the contractor shall cart off all dirt, leaving the street clear, returning the same for backfilling after the tubes are laid.

Care must be taken not to cover hydrants or gates belonging to other companies or city departments.

The contractor must supply all apparatus, labor, etc., required to keep trenches free from water, and must dispose of all pumpage as required by city authorities. Contractor must provide all apparatus for pumpage and pay all costs in connection therewith.

The contractor shall provide all necessary timbering, sheet piling, bracing, temporary covering, bridging, etc., for protecting the trenches and providing for the passage of the street traffic while the trenches are open.

In locating the line of trench across Battery Park from Battery Place to the customhouse, care must be taken to avoid the trees, if possible; but if any trees have to be removed, the work must be done under the direction of the proper city authorities and at the contractor's expense.

The contractor shall keep the street surface over and along the trench in a safe and satisfactory condition for a period conforming to the time required by the municipal authorities. If within this time he be notified that the paving or street surfaces over and along said trench needs repairing and he fails to make the required repairs within one week from receiving notice, the Government shall have the right to have such repairs made and to deduct the cost of same from money due the contractor.

The contractor shall also be responsible for any accident to persons or property that may happen during the said period on account of the defective condition of such surface.

All pipes found in the trench shall be properly supported by blocking or chaining to the satisfaction of the chief engineer and superintendent of public buildings, but this in no way releases the contractor from any obligation in case of accident.

53. *Pipe laying.*—All dirt must be removed from the interior of the tubes and the bores cleaned to the satisfaction of the chief engineer and superintendent of public buildings before they are placed in the trench. The bell ends of the tubes must also be thoroughly cleaned before the joints are made.

The tubes shall be laid with the bell ends of one line facing in the direction indicated by the chief engineer and superintendent of public buildings, and the bell ends of the other line in the opposite direction.

The tubes shall be so placed that the line be kept straight except where the course requires bends.

The nominal grade of the tubes shall be 4 feet from the street surface to the center of the tubes, but where objections occur at this level the grade of the tubes must be elevated or depressed, as the case may be, to clear the obstruction.

Wherever such elevation or depression occurs, the flanged wedge pieces heretofore specified shall be inserted in each pneumatic tube at the highest level, and unless the tube is below water level wedge pieces shall also be placed at the lowest points of the grade, or by a deflection in the tube joints not exceeding 2 inches in 12 feet.

The 4-inch wiring conduit shall follow the same profile as that required for the pneumatic tubes.

When laying the pneumatic tubes in the trench they shall have a positive bearing on wooden blocks, viz: The successive lengths shall be put in position with one end supported by the end of the tube last laid, the other end to rest on wooden blocking not less than 28 inches long and of sufficient height to raise the tube to the required grade; said blocking to be not less than 6 inches wide, and placed as close to the end of the tube as may be, without interfering with the calking of the joints. Wedges 6 inches long, made of 2 by 2 inch spruce, shall be placed on the blocking to hold the length of tube in position. Each

male end shall be set into the counterbore at the bottom of the bell which it joints, so that the male end shall bottom in the counterbore, except where the chief engineer and superintendent of public buildings directs that clearance be left. Careful measurements of each length of tube shall be made, and proper marks made thereon, so that when the tubes are placed in position the exact clearance in the counterbore, if any, may be determined.

After a length of tube is placed in position in the trench an iron mandrel attached to a 15-foot rod shall be passed through the tube and joint. If the mandrel meets with an obstruction and can not be moved freely by hand through the tube and joint, the length must be so adjusted that the mandrel will pass, or if the free passage of the mandrel is hindered by dirt or packing the same must be removed. When it is necessary to change the direction of the line of the tubes this may be done by making a slight angle in the line at each joint, provided, however, the mandrel may be moved freely past said joints; but where the change in direction is abrupt, so that the mandrel will not pass freely, then the cast-iron bends, regular or special, heretofore specified, shall be used.

After each joint is made, the iron mandrel must again be passed through it, and if the mandrel wedges or does not move freely, the joint must be corrected to the satisfaction of the chief engineer and superintendent of public buildings before any more lengths are laid.

The bell and spigot joints will be calked with lead and oakum, the flange joints with sheet lead not less than $\frac{1}{32}$ inch nor more than $\frac{1}{16}$ inch thick. Gaskets shall be full size of flanges, but must be cut so that they will not protrude into the bore when the joints are made up.

The calked joints shall be made with picked oakum and best pig lead. Strands of clean yarn shall be carefully rammed into the bell, sufficiently firm to cause the yarning tool to spring back when impinged against it. The space left for lead in each joint must not be less than 2 inches.

A fresh ladle of hot lead must be used to make each joint. No two joints may be poured with lead taken from the pot at one time. If in special cases the chief engineer and superintendent of public buildings orders a greater lead depth to be given, it shall be done without extra charge.

The "snake" or "clip" for holding the lead shall be so set that after the joint is poured and clip removed, the lead on its outer circumference shall be flush with the face of the bell, and on its inner circumference shall extend not less than $\frac{1}{8}$ inch. This extension shall be carefully driven back into the bell until the calking brings the lead flush with the face of the bell at every joint.

Necessary lead for joints must in every case be supplied in one continuous pouring.

The joints in the 4-inch cast-iron wire conduit shall be made in accordance with specification for the 8-inch tubes, except that the lead depth shall suit the size of the pipe.

54. *Testing.*—The pneumatic tubes shall be tested, and carefully examined for leakage while under air pressure of 25 pounds per square inch before filling the trench. Such tests shall be made from manhole to manhole. The pressure shall be maintained long enough for a careful examination of the pipe and joints. To detect leaks that are not otherwise apparent, soapy water shall be applied to all joints or other suspected places, and where leaks occur they must be stopped in a manner approved by the chief engineer and superintendent of public buildings. Defective sections or fitting must be removed, and perfect ones substituted. After the visible leaks are stopped the air must be cut off from the compressor, and to be satisfactory the pressure must remain on the tubes and shall show no appreciable drop in five minutes after the air within the tube has reached a stable temperature.

After the tube lines are completed and closed, an air pressure of 25 pounds per square inch shall be again applied, but this time to the whole line, and maintained long enough for examination and test of all joints in the manholes with soapy water. All leaks must be stopped.

The above specified tests shall be made in the presence of the chief engineer and superintendent of public buildings, or his authorized representative, and the results of such tests shall be entirely satisfactory to him.

The contractor must provide a suitable air compressor and motor for this work, which shall be operated at his expense. He shall also furnish all fittings, piping, hose, valves, instruments, etc., necessary for the specified tests and pay for all power and labor.

No tests are required for the 4-inch wiring conduit.

After the tests and before back filling the trench all joints in all lines shall be swabbed with two coats of hot asphaltum. If fiber conduit is accepted, the joints shall be waterproofed in accordance with the best practice in vogue for that material.

55. *Manhole*.—Wherever there are wedge fittings inserted in the tube lines a manhole marked "A" (see drawing) shall be located for access to same. Manholes A, with wedge fitting, shall be placed in the line at other points than at the high and low grades for access to tubes—i. e., when the horizontal runs of tube exceeds 600 feet, and the distance between such manholes shall not exceed 600 feet. Where the lines change grade when crossing underground trolley conduits, or subway tunnels, there shall be a manhole A on each side of such conduit or tunnel.

There shall be at least one manhole B in each block for access to the wiring conduit, but when the blocks are longer than 300 feet there shall be two such manholes in the block for access to the conduit, except that if there is a manhole A in any block it may be taken in lieu of B, but any manhole, whether A or B, that may be needed to furnish access to wiring conduit, shall not be more than 300 feet apart.

The manholes shall be constructed of hard-burned red brick, laid in Portland-cement mortar on 9-inch concrete bed.

The manhole covers and frames shall be of cast iron, of weight, design, etc., to comply with city regulations, the frames resting on cast-iron tee bars or cast-iron leveling strips.

There shall be two covers for each manhole, the outer one loose, the inner one to make water-tight joint on inner projecting flange of frame.

The joint shall be made with a gasket of 1-inch diameter rubber tube fastened down with suitable set screws and cast-steel yoke, the yoke to be fitted with a brass nut.

Plaster the outside of brickwork of manholes with 1 inch of cement mortar, and coat the interior of manhole with two coats of hot asphalt.

56. *Mortar*.—The mortar used in this work shall be composed of 1 volume of Portland cement and 3 of sand.

57. *Concrete*.—The concrete shall be composed of 1 volume of Portland cement, 2 of sand, and 4 of broken stone, thoroughly mixed and placed in excavation very wet.

58. *Back filling*.—All the material taken from the trench shall as far as possible be returned upon back filling. Any residue shall be removed by the contractor immediately upon the completion of back filling. In back filling earth only may be used for a space of not less than 6 inches around the tubes and castings. The best of the excavated material shall be deposited in layers not more than 6 inches in depth, each layer to be thoroughly rammed, to the satisfaction of the superintendent or his representative before the next layer is deposited in the trench.

When the trench is in rock excavation the refilling shall be done with earth.

The contractor shall provide the necessary flat tamping irons to be used in tamping the earth under the tubes.

The street surface shall be finished in accordance with the requirements of the municipal authorities.

59. *Fish wires*.—This contractor shall pull a No. 10 galvanized steel fish wire through the wiring conduit, and secure same in manholes "A," out of the way of access to the pneumatic tube wedge fittings in such manholes.

60. *Entrance to buildings*.—This contractor shall bring the tubes and wire conduit into both buildings where shown or directed, and shall thoroughly close the openings around the pipes and repair the waterproofing to the satisfaction of the chief engineer and superintendent of public buildings.

61. *Terminals*.—This contractor shall furnish and place all of the requisite terminal apparatus, motors, steam or electric air compressors, piping, tanks, sending and receiving devices, and all other appliances that may be needed for the satisfactory operation of the tubes.

The sending and receiving apparatus at each terminal shall be of the latest approved design of transmitting and receiving machinery, fitted with all devices belonging thereto, and all suitably mounted and placed in each building where shown or directed.

After the award of the contract the successful bidder shall submit drawings in triplicate of the transmitters, receivers, etc., that he proposes to furnish. Successful bidder must also furnish other drawings as may be called for. No drawings are to accompany the proposal.

Furnish for each terminal one pressure tank 4 feet diameter by 8 feet high, the shells of which shall be made of $\frac{1}{4}$ -inch tank steel and heads of $\frac{3}{8}$ -inch flange steel. The heads shall be bumped or pressed to a radius of not more than 4 feet and placed in tank with one flange turned in, the other flange turned out. The joints shall be single-riveted lap joints, made with $\frac{5}{8}$ -inch diameter steel rivets spaced not more than 2 inches center to center.

The tanks shall be mounted at such height and in such location as shall best suit the connections to other apparatus.

Furnish for each tank the following attachments:

One 11 by 15 inch manhole, with pressed steel frame, cover, dogs, packing, and suitable bolts.

Two cast-steel 8-inch threaded flanges, or two cast-steel 8-inch flanged nozzles.

One 4-inch pop safety valve.

One pressure gauge having noncorrosive movement with 6-inch dial, graduated to 30 pounds pressure, set in polished brass case.

The pinion, pinion staff, sector staff, and the hair spring of the gauge must be constructed of either nickel, phosphor bronze, Tobin bronze, or German silver, solid, not plated. The top and bottom plates must be made of one of the above metals, solid, or of brass or steam metal, with substantial bushings of one of the above metals, as specified for the pinion and sector staffs. Levers, slides, and their adjusting or pivot screws may be made of brass or steam metal.

The tanks shall be placed where shown or directed, and the pipe connections from the compressors and tubes made thereto.

Make cross connection, properly valved, between the two tubes at each end that will enable the tubes to be thrown in series at either terminal, so that they may be served by either compressor and motor should the other be disabled.

62. *Piping*.—The piping in the buildings embraced in this contract (except otherwise specified or noted) must be of the best quality, full weight, wrought-iron or mild-steel pipe, of sizes noted or specified, true, round, and with full-cut threads. The sizes given are the nominal internal diameter in all cases.

Fittings, unless otherwise specified or noted, must be of best quality cast iron, free from all defects and of standard weight pattern. Elbows and tees must be of the long radius or sweep pattern where structural conditions permit.

Pipes $2\frac{1}{2}$ inches diameter and larger shall have flange union connections at machinery or where special conditions shall require same. Where unions are needed on pipes 2 inches diameter or smaller, all-brass, heavy pattern, ground-joint unions are to be used, for the use of malleable-iron unions or long screws will not be permitted.

All screw joints shall be made up tight without calking the threads. Lubricating material used with screwed joints may be red lead and linseed oil or any other approved compound.

All flanges used in this work must be of standard weight, and whether on pipes, fittings, or valves must be faced true.

All fixtures, etc., calling for flanged connections must be fitted with companion flanges, and the flanges at each joint must match.

The gaskets must be full gaskets—that is, they must be of the full diameter of flanges between which they are placed.

63. *Pipe supports*.—All overhead pipes shall be supported by heavy adjustable wrought-iron expansion hangers, spaced not more than 10 feet apart. Where space will permit, hangers must be designed with a right and left coupling or turnbuckle or other approved means for making vertical adjustment of hanger without blocking up pipe or removing the supporting ring.

Where there are valves or other heavy fittings, additional hangers shall be provided if so directed by chief engineer and superintendent of public buildings.

64. *Valves*.—Valves 2 inches diameter or smaller shall be made of best grade of steam metal; valves $2\frac{1}{2}$ inches diameter and larger shall have iron bodies with brass trimmings; valves 4 inches diameter and larger shall be flanged; those $3\frac{1}{2}$ inches diameter or smaller may be either flanged or screwed, as desired. Stop valves, unless otherwise specified or noted, shall be standard weight gate valves with solid wedge noncorrosive seats.

65. *Compressors*.—This contractor shall furnish and erect at each terminal a compressor or blower having a capacity to furnish enough air at the pressure required to operate one 8-inch tube between the two buildings, a distance of approximately 10,500 feet, at an average speed of 30 miles per hour when sending at fifteen-second intervals.

Consideration will be given to proposals naming either the piston or rotary blower type, and each bidder shall name in his proposal at least one make of each type of such compressor or blower and the lump sum for which he will furnish either type.

Each bidder shall also state in his proposal the power absorbed at the compressor shaft, including the slip, heating, mechanical losses, etc. (but excluding the motor losses), for each type, to compress 1,000 cubic feet of free air per minute to the pressure per square inch named in the proposal as the pressure required to operate the tube under the specified conditions.

Bidders will also state the displacement of compressor in cubic feet of free air per minute, exclusive of slip or clearance, and the speed of compressor in revolutions per minute when the tube shall be working at an average rate of 30 miles per hour.

66. *Rotary blowers.*—Rotary blowers shall be of the two-impeller type, with all parts rigid enough to retain their shape when working under the maximum pressure, which may at times be 50 per cent higher than the working pressure at 30-mile rate.

The impellers must be machined all over, and must be of such shape and size that they will revolve freely, and neither touch each other nor the casing (or cylinder) in which they are placed. The clearance between the impellers themselves, the impellers, and the cylinders or heads must not exceed $\frac{1}{2}$ inch.

The shafts must be of steel best adapted for the purpose, and have the journals ground to size; the journal boxes must be long and rigidly supported by the cylinder heads, and placed far enough from the cylinder heads to allow placing a proper stuffing box for the shafts.

The journal-bearing boxes shall be of the ring-oiling type, provided with the necessary oil reservoirs, grooves, channels, rings, etc., for the thorough distribution of oil to the journals, and be fitted with the usual gauge glasses, drain cocks, etc.

The boxes shall be lined with the best grade antifriction metal, hammered in place and bored to fit the shaft.

The shafts must be connected by two pairs of wide-faced steel gears, cut from the solid, keyed and clamped to the shafts, and designed for the maximum work of the compressor.

The gears shall run in suitable oil-tight gear boxes that shall be fitted with adequate means for lubrication.

The blower will be driven by one of its two shafts, direct connected, properly coupled to the engine or motor driving same.

67. *Piston compressors.*—Piston compressors shall be of the horizontal, double-acting duplex (or twin) type, with the cranks set at right angles.

The compressor shaft shall be provided with a fly wheel heavy enough to take up the inequalities of turning effect on the crank shaft due to variations of the load during each compressor stroke.

The running gear, framing, shafts, etc., must be proportioned for maximum load, and must operate without deflection or distortion under all stresses of load.

The main journal boxes, connecting-rod boxes, etc., shall be lined with the best grade of antifriction metal, and the crosshead wearing faces shall be faced or spotted with same.

Continuous or sight-feed lubrication shall be provided for all principal journals or rubbing surfaces.

Suitable means of adjustment for wear must be provided for all journals and rubbing surface.

The cylinder may be fitted with either poppet valves, mechanically operated valves, or a combination of both, but must be designed with minimum amount of clearance.

The pistons shall be wide (thick), in one piece, cast hollow, as light as possible consistent with strength, and the castings must be sound, and all openings into the interior must be plugged absolutely tight, for air must be kept from the inside of the piston.

The piston packing shall be metallic packing of the most approved type for the work.

Provide suitable means for lubrication of cylinder and valves.

The successful bidder after award of contract shall submit detail drawings of the compressor selected.

68. *Motive power.*—The compressor at the customhouse shall be electric driven, while that at the appraiser's warehouse may be either electric or steam driven.

69. *Steam engine.*—If steam power is adopted the engine shall be a single cylinder engine, direct connected to the compressor shaft, made tandem to either compressor; twin piston compressors to be furnished in this case.

The engines shall be fitted with single eccentric, four-valve gear, with cylinder so proportioned that when the tube is being worked at the 30 miles per hour rate, the cut-off shall not be later than one-third nor earlier than one-fifth of the stroke.

The specification for bed plate, framing, running gear, bearings, oiling devices, piston packing, etc., for the piston compressors shall also cover similar parts of engine construction.

The governor shall be of the belt-driven, fly-ball type, fitted with the usual dashpot, safety stop, and suitable speed-regulation device by which the speed of the engine may be controlled from 40 per cent below to 15 per cent above normal while engine is running.

70. *Piping.*—This contractor shall furnish and place all the steam, exhaust, and drip piping to properly connect the engine to the existing pipe systems in place. All this work to be installed as directed by the chief engineer and superintendent of public buildings.

71. *Nonconducting covering.*—After the piping has been tested and proven tight, the nonconducting coverings shall be applied. All of the exposed steam and exhaust pipe placed under this contract must be covered with nonconducting, fireproof, sectional, removable pipe covering, not less than $\frac{7}{8}$ -inch thick, with 8-ounce canvas jacket, put on in a first-class manner, using solid brass bands at the joints not less than No. 30 B. & S. sheet-metal gauge in thickness and of widths in harmony with the diameter of the pipe.

Fittings and valves may be covered with either sectional or plastic covering, as desired, finished with 8-ounce canvas and brass bands.

Covering acceptable under this specification must have as a basis either pure carbonate of magnesia (MgCO_3) or pure long-fibered asbestos, or a combination of the two materials, and for high-pressure piping must contain not less than 85 per cent and for low-pressure piping 35 per cent of the basis. The remainder may be made up of pure commercial carbonate or sulphate of lime. If the coverings contain other ingredients not before mentioned, they will be considered as impurities, and must not exceed more than 10 per cent of the total compound.

After being placed the covering shall be given two coats of asbestos fireproof paint, the second coat to be of color selected. Remove the bands while painting the covering and replace same after paint is dry.

The successful bidder shall submit to the Supervising Architect, express prepaid, samples of the covering, both sectional and plastic, shortly after the award of the contract, and the right is reserved to require the contractor to submit other samples, if the first submitted upon analysis fail to meet the specification requirements.

The samples submitted, and every section, bag, or box of covering delivered at the building shall have the manufacturer's stamp or label attached, giving name of manufacturer, and brand and quality of material, and samples shall also have name of bidder, and building for which it is intended, marked thereon.

72. *Alternate.*—Each bidder will state in the proposal sheet the lump sum for which he will install the pneumatic-tube service called for, but with the compressors electric driven at both terminals.

73. *Electric motors.*—The electric motors shall be of sufficient capacity to operate each tube under the specified conditions, and must be capable of running at 25 per cent overload for at least one hour without undue heating.

Each bidder must state on proposal sheet the guaranteed efficiencies at one-half and full load of the motors he proposes to use.

Each motor shall be direct connected to the driving shaft of its respective rotary compressor and either direct connected or gear connected to its respective piston compressor, and shall be wound for direct current, 240 volts at the customhouse and 115 volts at the appraisers' warehouse.

Armature shall be of toothed core construction, with windings thoroughly insulated and securely fastened in place, and balanced both mechanically and electrically.

Commutators shall be of drop-forged copper of highest conductivity, well insulated with mica of even thickness; and they shall run free from sparking or flashing at the brushes under all conditions of speed or load. They must be free from all defects and have ample bearing surface and radial depth as provision for wear.

Brushes shall be of carbon, having cross-sectional area of not less than 1 square inch for each 45 amperes of current, and for each motor, mounted on a common rocker arm.

Brush holders shall be of a design to prevent chattering, with individual adjustment in tension for each brush.

Bearings shall be fitted with approved continuous self-oiling devices.

There shall be an insulation resistance between the motor frame and field coils, armature windings, and brush holders of not less than 1 megohm.

The motors must be capable of standing a breakdown test of 1,500 volts alternating current.

Either or both of the foregoing tests may be applied at the discretion of the department's agent at the time of the shop tests.

The efficiency, heating, and insulation of motors shall be determined by actual test at the shops where motors are constructed in the presence of the department's authorized agents, who shall determine test conditions. The tests to begin within ten days after receipt of notice from contractors of their readiness to commence test; and to be at expense of contractor, except traveling and other necessary expenses of department's agent.

The maximum rise in temperature of the motors at a continuous run at shop at normal speed and full load for a period of eight hours must not exceed 85° F. above the surrounding atmosphere.

The motors and compressors are to be finished in a first-class manner, and where not polished must be filled and rubbed down, painted two coats at the shop, and after installation have two more coats, the finishing tints to be as directed by the superintendent.

74. *Foundation.*—The foundation for the compressors and motors shall be high enough to bring the working parts thereof within easy reach, and shall consist of hard-burned red brick laid in cement mortar. Any parts of the sides of such foundations that may be exposed above the basement floor shall be faced with white enameled brick.

The foundations shall either be entirely covered with the bedplates of the machines, or if not so covered any portion of the top of the foundation exposed shall be finished with stone (granite) coping.

Provision must be made in the frame or bedplate of the machine to catch all oil drip, and keep same from escaping to the foundation or floor.

When preparing the basement floors for the foundations the waterproofing beneath same must not be disturbed.

75. *Tablets.*—Furnish a tablet for each motor to be not less than 1½ inches thick, properly secured in place near its motor, located so that access may be had to all parts of same without moving it. The rheostat, wiring, etc., shall be mounted on the back of tablet, and the space behind such tablet shall be protected or inclosed with wire mesh grille so mounted that if necessary access may be had to the back of tablet.

Furnish and mount on each tablet speed-controlling rheostats of such character that the speed of the motor may be controlled by resistance in the field circuit to 15 per cent above normal speed, and by resistance in armature circuit to 50 per cent below normal speed at full load.

The rheostats shall be fitted with no-voltage release devices and shall be of approved make and construction, of noncombustible material, and well ventilated.

Furnish and mount on the tablet, in addition to the rheostats, one approved ammeter; one d. P. d. arm independent operation overload circuit breaker.

76. *Wiring.*—This contractor shall run all the wiring for the connection of motors and tablets, tablets and switchboard, making the connection to the switchboard in each building where directed and to the satisfaction of the chief engineer and superintendent of public buildings.

Conductors No. 8 and larger shall be stranded, rubber-covered, well-tinned, soft-drawn copper of highest conductivity, and must have a distinctive marking of the maker.

No splices or joints will be permitted in the feeders except at outlets, and there they must first be made mechanically and electrically secure, then sol-

dered and taped with three layers of rubber and two of friction tape. All connections No. 8 and larger must be made by soldering wires in cup lugs.

All conductors shall be run in conduits, which shall be of best quality steel tubing, of standard-pipe dimensions, smooth inside and out, electro galvanized, or enameled with a compound which will prevent oxidation and which will not soften or become sticky. Each length of conduit must have the maker's name, initials, or trade-mark permanently stamped thereon. Conduits must be of such size as to permit the ready insertion and withdrawal of the conductors without abrasion.

Conduits must be run with long bends, and not more than four quarter bends shall be used in any run. All bends must be free from dents and bruises, and the radius of the inner curve must not be less than 4 inches. Ends of conduit at each joint shall be cut square and reamed smooth. Conduits shall be continuous from outlet to outlet. Conduits which are run exposed must be run straight, parallel, or at right angles to wall or beam lines.

All material and workmanship shall be strictly first class, and the entire wiring system must be free from short circuits and from grounds, and have an insulation resistance between conductors and between conductors and ground, based on maximum load, not less than the requirements of the latest edition of the National Electrical Code.

77. *Carriers*.—Furnish 50 carriers of the latest approved design for 8-inch tubes, the carriers to be 24 inches long and 7 inches external diameter, constructed of galvanized sheet steel.

The longitudinal joint shall be a soldered single-lock seam, or riveted or soldered, as may be required by the chief engineer and superintendent of public buildings; one head of the carrier (bottom) shall be cupped, riveted, and soldered to shell, and fitted on outside with an elastic buffer.

The other head (top) of the carrier shall be a hinged cover, fitted with strong hinges, in such a way that when closed the cover shall set in from the end of the carrier, forming a recess for the locking device.

The locking device must be easily manipulated, and of such character that when the carrier is in the tube the lock can not become undone while it is in transit.

Each carrier shall also be provided with two packing bands, approximately 2 inches wide, fitted with approved elastic packing, turned to $\frac{1}{2}$ inch less than the bore of the tubes. The packing bands shall be placed on the carrier shell so that the overhanging ends or middle of body of shell shall not touch the interior of the tube when carrier is rounding the shortest radius bends in the line.

The contractor shall furnish for approval one sample carrier, complete, that he proposes to furnish.

78. *Tool cabinets*.—This contractor shall furnish a properly constructed tool cabinet of quartered oak and approved dimensions and designs, with door, hinges, lock, and keys, for each building, to be placed where directed, each cabinet to contain a full set of wrenches and special tools needed for the operation and maintenance of the apparatus.

79. *Painting*.—All exposed new work or existing painted work disturbed by this contractor in both buildings, not elsewhere specified to be painted, shall be given one printed coat, finished with two coats, tints to be approved by the superintendent.

80. *Tests of apparatus*.—After the completion of the installation of the pneumatic-tube system, as specified, this contractor shall make a twelve working-days' run of the same, to test the efficiency and capacity of the apparatus, and for the instruction of the employees of the Government who shall afterwards operate the same.

Preliminary runs shall have been made by contractor to perfect the adjustment of the apparatus, etc., previous to the beginning of the official test, so that there may be an uninterrupted service of the tubes during the official runs, and during the preliminary runs the contractor shall pay for all current and furnish the fuel if steam-driven apparatus is installed.

The official tests shall be made under conditions named under "Tests and inspections," except that during such test the power will be furnished by the Government, for any mail or other matter offered for transmittal by tube which shall be sent, but the contractor shall furnish expert operators enough at both buildings to demonstrate all points in connection with the successful operation of the apparatus, and to give whatever instruction may be necessary to the Government employees.

The test shall be made for six days at each building, and to be acceptable the tubes shall be uninterruptedly operated for seven hours per day, except for such time as may be needed to make the changes for the different tests hereafter specified. If during any day's run the tests have to be discontinued on account of stoppage of machinery or tubes for which the contractor is responsible, the test specified for that day shall be repeated.

The apparatus shall be run for three days at each building under full load condition (30 miles per hour rate), with carriers at 15 seconds interval; one day at each building, at same speed, with carriers at thirty seconds interval; one day at each building, full speed, with carriers at one minute interval; one-half day at each building at 20 miles per hour rate, with carriers at thirty seconds interval.

Readings shall be taken for power consumption every fifteen minutes during the test runs at each building by a representative of the department, and if steam power is installed at the appraiser's warehouse indicator diagrams shall be taken from both ends of the steam cylinder every fifteen minutes, and if duplex piston compressors are installed from both ends of the air cylinders at same interval.

Fifteen-minute readings shall also be taken of the air pressure.

The reading shall be taken at but one building at a time, but the machinery shall be operated and tubes served at same rate simultaneously at both buildings.

Readings shall be taken in such a way as will show the variation in power and pressures for the operations of the tubes at the different speeds with tubes open, and with carriers at wider and closer intervals with weight of carriers noted, both full and empty.

The instruments used during these tests shall be furnished by the Government, but the contractor shall make provision for connecting the same.

If the electric motors are found to heat above the limit specified during the full-load tests, they shall be rejected, and this contractor shall replace same with motors that will meet the specified requirements, and the full load tests be repeated.

Upon the satisfactory completion of the operating tests of the apparatus and its acceptance by the Supervising Architect, the balance due upon the contract shall be paid.

JAMES KNOX TAYLOR,
Supervising Architect.

[Double pneumatic-tube service, New York, N. Y.]

PROPOSAL FOR THE INSTALLATION OF A DOUBLE PNEUMATIC-TUBE SERVICE BETWEEN THE UNITED STATES CUSTOMHOUSE AND THE UNITED STATES APPRAISERS' WAREHOUSE, NEW YORK, N. Y.

N. B.—After this proposal sheet is filled out it must not be forwarded under frank, but must be detached and forwarded under separate cover with postage prepaid by the bidder.

Bidders are expressly notified that the checks of the two lowest bidders will be held uncollected and at their risk until the bond required shall have been approved by the Secretary of the Treasury.

-----, 1910.

To the SUPRISING ARCHITECT,

Treasury Department, Washington, D. C.

SIR: ----- hereby propose to furnish all the labor and material required for the installation of a double pneumatic-tube service between the United States customhouse and the United States appraisers' warehouse, New York City, N. Y., in strict accordance with drawings Nos. P. T. 1 and P. T. 2 and this specification.

For rotary blower installation in both buildings, one electric in customhouse and one steam driven in appraisers' warehouse.

----- (\$-----)

For piston compressor installation in both buildings, one electric in customhouse and one steam driven in appraisers' warehouse:

----- (\$-----)

For rotary blower installed at both buildings and both electrically operated:

----- (\$-----)

For piston compressors installed at both buildings and both electrically operated: _____ (\$_____)

For rotary blower at customhouse, electric driven, and piston compressor, steam driven, at appraisers' warehouse: _____ (\$_____)

For rotary blower at customhouse and piston compressor at appraisers' warehouse, both electric driven: _____ (\$_____)

Time to complete, day _____, month _____, year _____.

Price per piece for carriers: _____ (\$_____)

Deduction from above-named lump sums if fiber conduit shall be accepted: _____ (\$_____)

Addition to above-named lump sums if fiber conduit shall be accepted: _____ (\$_____)

Name three places where 8-inch tubes with own apparatus as specified is in use:

	Name:	Address:	Length of time in service:
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____

Bidders are required to give the name and address of two or more, as indicated, different manufacturers and trade name or catalogue number of each of the following fixtures and materials which they propose to use, subject to approval of the Supervising Architect. The names of as many different manufacturers must be stated as are called for.

Two makes rotary blowers:

1 _____
2 _____

Two makes piston compressors:

1 _____
2 _____

Two makes electric motors:

1 _____
2 _____

Two makes of steam engines:

1 _____
2 _____

Type of valves for steam engine:

Corliss _____

Slide _____

Air pressure required to operate the tubes at 30-mile per hour rate:

_____ pounds per square inch.

Volume of air per minute, 30-mile per hour rate:

_____ cubic feet.

Power required at compressor shaft to compress 1,000 cubic feet free air per minute to operating pressure rotary blower:

_____ horsepower.

Power required at compressor shaft to compress 1,000 cubic feet of free air per minute to operating pressure, piston compressor:

_____ horsepower.

Displacement per minute rotary blower _____ cubic feet free air.

Displacement per minute piston compressor _____ cubic feet free air.

Speed, rotary blower _____ revolutions per minute.

Speed, piston compressor _____ revolutions per minute.

Speed of motor for rotary blower _____

Speed of motor for piston compressor _____

Make of transmitting apparatus: _____

Make of sending apparatus: _____

Two makes of rheostats:

1 _____
2 _____

Two makes of circuit breaker:

1 _____
2 _____

Two makes of ammeters:

1 _____
2 _____

Guaranteed efficiencies of motors for rotary blowers:

One-half load _____

Four-fourths load _____

Guaranteed efficiencies of motors for piston compressors:

One-half load _____

Four-fourths load _____

Three makes of gate valves:

1 _____
2 _____
3 _____

Three makes of globe and angle valves:

1 _____
2 _____
3 _____

In determining which is the lowest bid, it is understood that the Government reserves the right in awarding the contract to deduct any separate amount named in the proposal for any item mentioned therein.

NOTICE: A certified check must accompany this bid to entitle it to consideration.

Signature _____

Address _____

Names of individual members of firm _____

Name of corporation _____

Name of president _____

Name of secretary _____

Under what law corporation is organized _____

COST OF PNEUMATIC-TUBE OPERATION.

APPRAISERS' WAREHOUSE AND CUSTOMHOUSE,
New York, N. Y., June 4, 1912.

The SUPERVISING ARCHITECT, *Treasury Department.*

SIR: I transmit herewith copy of my telegram of this date answering certain inquiries from you of same date regarding operation of customs pneumatic tubes between the United States appraisers' warehouse and customhouse buildings, New York, N. Y. There are also transmitted herewith a copy of memorandum from the office of the collector of the port and a copy of memorandum from the appraiser of the port, both concerning said matter. These memoranda are self-explanatory.

I do not think the real value of the tube service can be gauged by comparison with cost of former messenger service any more than one could gauge the value of mail service performed by express trains with mail service using stage coaches, or transmission of mail by pneumatic tubes in cities with mail service by wagons.

I may add that I have always assumed that ultimately this tube might be made to form a part of the postal system in New York City via a connection, let us say, between the foreign-mail station on the west side and the appraisers' warehouse.

Respectfully,

ALFRED BROOKS FRY,
Supervising Chief Engineer.

[Memo from Special Deputy Collector Stewart, in re pneumatic tubes, appraisers' warehouse to customhouse, New York, N. Y.]

JUNE 4, 1912.

Under messenger system as it existed prior to institution of the tube service three messengers were employed in conveying papers to and fro between the customhouse and the appraisers' stores. Messages were dispatched half-hourly during the day.

Under the tube system the regular transmission of papers to and fro is at half-hour intervals in the morning, when work is light, and at 15-minute intervals during the afternoon, when work is heavier. When work is unusually heavy or when there are papers of importance requiring immediate action, the regular intervals are disregarded, and papers are transmitted forthwith.

Under the old messenger system the regular intervals could not be disregarded. If there were papers to be transmitted "special," a special messenger had to be assigned. As at least an hour's time would be consumed in going to and coming from the appraisers' warehouse, and as there were always papers requiring special transmission, it is apparent that much extra labor was employed and much time lost as compared with the tube. On the tube service three men are regularly employed, covering both the regular and the special service given under the old system, and producing much better results to both officials and the public.

A special advantage, aside from those already indicated, is in the case of deliveries at the public stores, where the invoice must be sent to the collector for collection of an additional deposit before issuing a delivery order. The tube service permits such invoices to be sent down from the stores forthwith whenever deemed advisable. Under the old system a special messenger was required, and owing to lack of men this had to be confined to extreme cases. The benefit to the public in obtaining rapid deliveries is apparent.

Letters and other documents may also now be transmitted immediately, where formerly they had to be sent by mail or special messenger, and where formerly several days' time would be lost in sending such papers back and forth it can now be made a matter of minutes. Conservatively speaking, the present service is from 100 to 150 per cent better than the old.

[Memorandum in re pneumatic tubes from Appraiser Bird.]

JUNE 4, 1912.

MY DEAR MR. FRY: Referring to your telephonic communication regarding the tube service between this building and the customhouse, that service is essential to the businesslike and expeditious conduct of business in this office. During the morning carriers run from this building to the customhouse, both ways, every 30 minutes. From 2 o'clock on they run every 15 minutes. Further, on any special matters requiring immediate action carriers are run at intermediate intervals. It takes 4 minutes for a carrier to get from here to the customhouse. This furnishes a prompt, continuous service from this building to the customhouse.

At one time there were 2 cabs and 2 messengers doing this work making 8 trips per day. Later there were substituted for this 3 messengers making 12 trips per day. With the present volume of business I do not believe that 3 messengers could do the work. Certainly the 3 messengers could not adequately do the work.

The system of handling cases in the appraisers' stores at the present time is such that it is essential that the invoices come to the appraisers' stores before the cases arrive at the appraisers' stores from the docks. As the importers hurry their permits to the docks from the customhouse, the invoices must be forwarded here rapidly to arrive here before the cases. Even under the present plan it does happen that cases arrive here before the invoices. If the tube service were discontinued and a messenger service substituted, I believe that it would be practically impossible to continue the present system of handling merchandise, which has resulted in a very great improvement in the business done.

Very truly, yours,

F. W. BIRD, *Appraiser*.

Mr. ALFRED BROOKS FRY,

Chief Engineer, Customhouse, New York, N. Y.

DATA CONCERNING GOVERNMENT-OWNED 8-INCH DIAMETER PNEUMATIC TRANSMISSION TUBES BETWEEN UNITED STATES APPRAISERS' WAREHOUSE AND UNITED STATES CUSTOMHOUSE, NEW YORK CITY, N. Y.

NEW YORK, *January 28, 1913.*

The route, which is diagonally across Battery Park and thence up Washington Street to the appraisers' warehouse, is shown on attached plan.

Tubes constructed during 1910 started for regular operation January, 1911 :

Appropriation for construction-----	\$175, 000
Contract cost, including electric conduit and all apparatus and equipment-----	174, 150
Number of tubes-----	2
Length of each tube between outside building lines-----feet--	10, 864
Total length of each tube, including the lines in interior of buildings, about-----feet--	11, 000
One electric conduit, 4 inches in diameter, containing a pull wire was laid with these tubes.	
There is one set of transmitting apparatus and one set of receiving apparatus, of American Pneumatic Service Co.'s type, located in both appraisers' warehouse and the customhouse.	
Number of rotary blowers (one steam driven, at appraisers' warehouse; one electric driven, at customhouse)-----	2
Maximum horsepower required for operation of each tube at maximum speed and capacity-----	55
Total horsepower for circuit at maximum speed and capacity-----	110
Maximum speed, say-----miles--	30
Air pressure required for 30-mile per hour speed-----pounds--	8-9
Volume of air per minute for 30-mile speed-----cubic feet--	1, 300-1, 400
Average horsepower required for normal operation of each tube----	25
Total horsepower for circuit, normal use-----	50
Normal speed of carriers, miles per hour-----	25
Maximum practicable rate of dispatch of carriers, say, headway-----second--	10
Ordinary full-speed dispatch, headway-----do-----	15

Average present normal dispatch of carriers between customhouse and appraisers' warehouse is one every 4 minutes.

It will thus be seen that if these tubes should be incorporated in the New York postal system their capacity could be easily increased.

Annual cost of operation of this system.

For electric power purchased at customhouse-----	¹ \$1, 502
Cost of our generated steam power at United States appraisers' warehouse, say-----	1, 000
Annual cost of repairs and supplies, including new carriers-----	672
Wages of three operators-----	2, 520

Total cost, based on calendar year of 1912-----	5, 694
---	--------

It is to be noted that without greatly increasing the operating expense the duty of these tubes could, as stated, be more than trebled if they were connected with the post-office system, experience showing that the increase in horsepower required does not largely increase with the number of carriers dispatched within reasonable limits, and it is obvious that an operator has to be paid his stipulated per diem wage whether he handles carriers at the rate of one in four minutes or four in one minute, although, of course, one man without relief could hardly keep up this rate of dispatch for eight hours.

Contrary to the practice when first started, the customs authorities are now transmitting all the brokers' documents and papers via these tubes, and as occasion requires the customs business of said tubes will obviously increase without reference to a possible future post-office connection.

ALFRED BROOKS FRY.

¹ If we ourselves generated this current the cost of said electric power would be about \$1,000.

RECENT CONTRACT PRICES FOR TRENCH WORK IN STREETS—CURRENT PRICES OF
ASPHALT AND BELGIAN BLOCKS, NEW YORK CITY, N. Y.

NEW YORK, *January 28, 1913.*

Excavation and back fill, per yard-----	\$1. 50
Restoration of asphalt surface, per yard-----	3. 50
For pumping and sheet piling, where required, add per cubic yard of excavation-----	1. 00
For street protection, signals, and lights, per yard of excavation-----	. 50
Insurance and watch service, per cubic yard of excavation-----	. 50
<hr/>	
Total cost of excavation per cubic yard, say-----	7. 00
Plus for contractor's profit, 25 per cent-----	1. 25
<hr/>	
	8.25

The foregoing is for asphalt.

For Belgian block surface, from \$1 to \$1.50 less per square yard of surface disturbed.

The above is figured on a trench 3 feet deep and 3 feet wide.

For extra bury, equal to diameter of pipe, say, 50 cents per yard.

The foregoing is for a trench 3 feet wide by 3 feet deep by 3 feet long, plus the bury of the pipe. This does not include any special conditions or repair of damage to existing structures, or making changes in existing structures to permit passage of pipes.

For wood pavement and its foundations, as now installed, add 50 cents per yard.

Thereupon, at 11.30 o'clock a. m., the commission went into an executive session.

MEMORANDUM OF JNO. E. MILHOLLAND RESPECTING HISTORY OF MAIL TUBE
SYSTEM.

THE INTERNATIONAL PNEUMATIC TUBE Co.,
Philadelphia, February 13, 1913.

Senator SIMON GUGGENHEIM,
*Chairman of Commission to Investigate Pneumatic-Tube
Postal System, United States Senate, Washington, D. C.*

DEAR SIR: Inclosed please find some chapters from the financial history of the tube enterprise that may be of service to you and your colleagues in the inquiry that you are now making.

You will perhaps recall that some emphasis was laid upon this matter by yourself, as well as Congressman Murdock, at our last somewhat informal hearing. Should you find that any points touched upon require further elaboration we shall be pleased to meet your wishes wherever possible.

Very truly, yours,

JNO. E. MILHOLLAND.

PNEUMATIC SECURITIES AS AN INVESTMENT—SOME CHAPTERS FROM THE FINANCIAL HISTORY OF THE UNDERTAKING—WHY IT HAS BEEN UNATTRACTIVE TO CAPITALISTS—THE MENACE OF SHORT-TERM CONTRACTS.

The financial history of the Philadelphia mail-tube system is the story of the first large tube enterprise of the world.

This does not signify that it was a financial success; it was anything but that; its triumph was as an invention of great usefulness and a sound engineering proposition.

At the close of the first five years the company was practically bankrupt, for in complying with the drastic conditions laid down by the Government in the original construction contracts and in consequence of the meager rentals allowed by the department the company had practically exhausted its capital and reached the end of its resources.

AN AMERICAN, NOT A FOREIGN INVENTION.

But before entering upon a detailed account of this and succeeding periods there should be corrected an erroneous impression that prevails regarding the pneumatic tubes. Most people suppose the system employed here to be an importation. This is a mistake. The only systems in use to-day on the other side are those of the small tubes, 3 inches or less in diameter, which carry telegrams, single letters, or messages in London, Paris, Berlin Vienna, and a few other foreign cities.

TUBES HERE AND ABROAD.

Any and all of these, however, are mere playthings in comparison with our post-office tube system, which is American in its invention and development. The 8-inch tubes, through which are transported the mails from the Pennsylvania Railroad Station to the Philadelphia post office, can carry more than 7,000,000 letters a day, which exceeds the number carried by either the entire London or Berlin systems during the year of 1911, or far more than twice the business done by the famous "Petit Bleu" service of Paris in any year of its operation.

PHILADELPHIA THE PIONEER OF PNEUMATICS.

Not only is the large tube American in its origin, but Philadelphia can rightfully claim to be the place of its birth, for in Philadelphia the system was started nearly a score of years ago. Its famous inventor, Mr. Batcheller, was then a resident of the city. Another leading Philadelphian was then Postmaster General, and the pneumatic-tube system really represents one of the various reforms brought about in the Post Office Department under the administration of the Hon. John Wanamaker.

THE ANTIQUATED MAIL WAGON DOOMED AT LAST.

The antiquated character of city mail delivery had long been apparent. As a business man, Mr. Wanamaker could see no reason why speed should not be employed in the delivery of letters within the city limits just as eagerly as it is sought between cities and countries through subsidized mail trains and ocean steamers. In other words, he recognized the gap in the transportation development which that anachronism, the old mail wagon—that has been in use since the days when Oliver Cromwell reorganized the British post office—vainly tries to fill, but which really only add to the congestion of our overcrowded streets and avenues and overcrowding that is in no way lessened by the automobile or any other system of surface transportation.

MR. WANAMAKER'S SERVICE TO THE ENTERPRISE.

Believing the pneumatic tube or underground transport to be the solution of the mail and parcel-post problem in large cities, Mr. Wanamaker appealed to the inventive genius of the world, causing an advertisement to be published broadcast asking for competitive bids to construct a 6-inch tube line between the Philadelphia post office and the bourse. The conditions imposed were severe. No risk whatever was incurred by the Government. The successful bidder was required to build at his own expense. He had also to agree to serve the Government a year free of cost, and then, even if successful, the adoption of the service rested entirely with the Government.

THE RISK TOO GREAT FOR CAPITAL.

To realize the undesirability of pneumatic-tube securities at that time for investment, at least from the investor's viewpoint, it is only necessary to refer to the report of Postmaster General Wanamaker for the year 1892, wherein mention is made that the first pneumatic tube for the transport of mail was being constructed in Philadelphia between the central post office and the East Chestnut Street Station, but under such terms that the Post Office Department can try the system for one year without expense, and may then rent, purchase, or reject it without incurring any liability. It can be easily understood that any body of men embarking in such a business, so placing their capital that even if attended with mechanical success their one and only customer might

fail them, while in the event of engineering failure the entire money put up would be lost, was not of a kind to attract investors, either conservative or those disposed to accept a small risk in the nature of the hazard of their principal for a high annual return thereon.

INITIAL WORK OF THE PHILADELPHIA CO.

The local company which had been formed to install the Batcheller system here, that is, the only really successful large tube system yet invented, having acquired the license for Pennsylvania from the parent company, was found to be the only one willing to meet these unprecedented requirements. But a company so situated and embarking in such a hazardous enterprise had no credit. Its way became very difficult. Early it found that the enthusiasm animating its promoters was not at all shared by the investing public of Philadelphia, so after many futile efforts with the various banking houses and financial institutions, it became necessary for the company to let a contract to a syndicate managed by the late W. J. Kelley for the construction of the line leading from the central post office to the East Chestnut Street postal station. The syndicate was to assume the burden of securing the necessary permits and franchises from the city of Philadelphia and receive in exchange for their undertaking the sum of \$300,000, payable in the common stock of the company. To secure the requisite patents covering the terminal and other machinery used in the operation of the lines for the city of Philadelphia and a radius of 20 miles, including Camden, N. J., it was necessary to pay \$200,000 in the common stock of the company to the inventor.

SECRETARY HARROP'S PERSONAL EXPERIENCE.

Mr. Charles T. Harrop, of J. T. Harrop & Son, a firm that has been established in Philadelphia since 1849, was secretary of the company in those early days of its life as he is to-day, has this to say of his experience in raising the initial capital:

"The project was entirely new. We had to ask for a franchise for a purpose practically unknown. Our difficulties seemed endless. One look at our contract with the Post Office Department was enough for the average investor—he fled. What money we secured was in small sums. I was glad to sell the stock at any price, even a dollar a share; that is, 10 per cent of its par value. Mr. Kelly nor one of the syndicate never made a dollar. 'Twas a losing game. The banks, bankers, saving funds, trust companies, life-insurance companies, and capitalists were visited but always they declined because of the inability of the company to guarantee a continuing contract. The small investors, many of whom still own their stock as originally subscribed for, are asking as to when they may hope for reimbursement for money paid into the project as many as 20 years ago. They deserve par if ever men did in this world. They ventured when merchants and men of large means when approached on the score of civic pride held back. One of the most ardent supporters of the tubes, the Hon. John Wanamaker, then Postmaster General, was prevented, as the head of the Postal Service, from lending his financial support, but he was then, as now, a strong advocate of the system. Mr. Kelly, president of the company, finally built, at his own expense, a factory for the purpose of boring the pipe and manufacturing the necessary transmission and receiving apparatus. He, like all the officers of the corporation, served absolutely without salary or compensation of any kind, and, so far as my experience goes, such salaries have never yet been paid in any manner. Mr. Kelly has been dead for several years and his estate still holds many thousands of dollars in securities of the Pneumatic Transit Co. for some of the amounts spent in the construction of the original tubes."

SMALL INVESTORS BUILT THE FIRST LINE.

The money was raised almost entirely in Philadelphia, and, in the face of seemingly insurmountable obstacles, not the least being the "tube-boring" problem, a line was built between the post office and the bourse, and on February 17, 1893, nearly 20 years ago, the first carrier containing the Bible, wrapped in an American flag, was sent through by Mr. Wanamaker. The line operated successfully from the beginning: it is working as well as ever to-day demonstrating through practical operation, the entire feasibility of transmitting mail

and merchandise by this means, an achievement which many engineers of Europe, after various futile, expensive efforts, 50 years ago, declared to be impossible.

The mails were carried one year, March, 1893, to March, 1894, free and then the Post Office Department, testing the system to the utmost, compelled the company to give four years' additional service at the nominal rental of \$3,400 a year, whereas, to operate a single mile of tube costs about ten times that sum. It was a losing proposition of from \$10,000 to \$12,000 a year and nearly ruined the company.

YEARLY OPERATIONS AT A LOSS.

In 1898, when the lines from the central post office to the Broad Street station were built, it was necessary for the company to issue to the contractor some two hundred 20-year 5 per cent bonds of \$1,000 each, in payment, and the contractor, in addition to building the lines, was obliged to satisfy a \$30,000 judgment which had been given to make up some of the operating losses of the company up to that time. The difficulty was that, owing to the short term of the contract, one, four, or even 10 years, the company was wholly without credit and unable to borrow money for, notwithstanding the increase in the length of the lines, the annual operation from 1898 until 1906 was conducted at a loss of approximately \$5,000 per year.

FAILURE OF CONGRESSIONAL APPROPRIATION—THE REASON.

In the year 1901 the company was further handicapped by the failure of Congress to make an appropriation for the pneumatic-tube service, so that to the risk inherent in the Government's possible failure to renew the contract, was added the additional deterrent that, notwithstanding the existence of a contract, if Congress should, for any reason, fail to make the necessary appropriation to pay for the service, the tube property would become totally unproductive for the time being. Regarding this failure on the part of Congress to appropriate it is only pertinent to remark here that the appropriation for tubes was cut off; but upon the vigorous demand of the press, public, and the tube companies a Government commission was immediately appointed to inquire into the subject. This commission, one most representative in character, included besides 32 postmasters and leading experienced post-office officials, the following citizens: Theodore C. Search, chairman, president of the National Association of Manufacturers of the United States; Prof. Robert H. Thurston, of Cornell University; S. Christy Mead, of the Merchants' Association of New York; William T. Manning, consulting engineer, United States public buildings; Frederick A. Halsey, associate editor of the *American Machinist*; and Lyman E. Cooley, consulting and mechanical engineer.

Their report was unanimously in favor of the tubes, and so emphatic that an immediate reinstatement of the system followed without a single dissenting vote in either House or Senate on the part of Democrats, Republicans, or Independents, extending the contracts from 4 to 10 years.

In the year 1902, when the Postmaster General was authorized to enter into pneumatic-tube contracts for the period of four years, the financial condition of the pneumatic-tube business in Philadelphia was such as to render it impossible to secure new capital with which to extend the lines until the fall of 1905, when the lines running between the central post office and stations S and O were completed.

In the year 1906 the Postmaster General was authorized to enter into pneumatic-tube contracts for the period of 10 years, in consequence of which change toward permanency, the pneumatic-tube mileage in Philadelphia increased about 250 per cent, or from 4 to 10 miles double lines; that is more mileage than had been built in the preceding dozen years.

The present contracts under which the pneumatic-tube companies operate expire in 1916, or about three years hence. While the company is not now meeting with any difficulty in the operation of the existing system, it is not in a position to undertake any additional or new construction. This is due to the short period in which the contracts have to run, and, furthermore, the company realizes that its own stockholders have supported it to the point beyond which they are unable to go by enlarging their holdings.

REPRESENTS AS HONEST AN INVESTMENT AS ANY RAILROAD.

Our stock and bond holders have securities which while they proportionately represent the investment of money, time, and labor in the production of a physical tangible property to as great, if not greater, extent than any industrial or railroad corporation in the United States, yet they are not able to realize on their investment, or to exercise the rights of ownership to any extent whatsoever, when compared to the holders of the securities issued on any other form of property.

While the holders of our bonds and preferred stock receive an income thereon regularly they are unable to use their securities to secure loans, as could be done if their securities were issued by any other corporation than a pneumatic tube company that has made its investment in a business which has only one customer and its contract with that customer for only a short period. The result is that although they have invested in an enterprise that is sound to the core, they realize that it is not good business policy to increase their investment in a security which curtails their borrowing power to the extent of such investment.

MR. HAYDEN'S TESTIMONY PRACTICAL

Mr. Hayden in his testimony before the commission on December 2, 1912, stated that although their company was engaged in an independent enterprise separate and apart from their large pneumatic mail-tube business, when they offered for subscription to their shareholders a million and a half of 7 per cent preferred stock, preferred not only as to dividends but as to assets, they received an acceptance as to only 4 per cent of their offerings. When you consider that the annual return to the share of net earnings from the small tube or commercial business of the American Pneumatic Tube Co. is almost three times more than the amount required to pay the dividends on the 7 per cent preferred stock offered for sale and that the return from all their business, including the mail tubes, is almost six times the amount necessary to meet the dividends on the preferred stock offered, it is not very hard to reach the conclusion that the investing public has a decided aversion to placing their money into pneumatic mail-tube enterprises, irrespective of how attractive the inducement may be. When an industry is so situated and the hazards, owing to short-term contracts, are such that it is unable to deal directly with a bank or the custodian of investment funds, but must look to individuals who are willing to tie up their capital for a long period and risk the hazard of its entire loss, then and in such case the industry must stand still, or the fettering conditions must be removed.

THE RURAL MAIL DELIVERY—A COMPARISON.

The rural mail delivery made its advent into the United States Postal Service at about the same year that the pneumatic mail tube was born, and to-day the Department spends some \$47,000,000 per year on rural delivery, whereas the tube operation entails an expense of less than \$1,000,000 per year in rental, although if all the cities in the United States having sufficient population to justify the tube service were equipped, the annual tube expenditure would be nearer \$10,000,000 than \$1,000,000. In comparing the growth of the rural mail delivery with the tube service you must take into consideration the fact that the expenditure for rural delivery is primarily the payment of salaries to letter carriers, substitutes for carriers on annual leave, clerks in charge of substations, and tolls and ferriage, whereas for the payment of every dollar in pneumatic tube mail service means that someone must be found who is willing to invest \$8.50 at least in supplying the pneumatic-tube service by the Government, as the proportion of the annual rental is to the approximate investment in pneumatic-tube systems as 8½ is to 1.

This investment of \$8.50 to every dollar of rental must all be made prior to the receipt of a dollar of rental and must be made on a short-term contract, subject to the possible refusal of Congress to make the necessary appropriations which makes unproductive the investment and curtails if it does not destroy the credit of the investor, and gives him a form of property which is to a high degree unmarketable, besides it ranks extremely low as collateral for the security of any subsequent loan the investor may desire to make.

To recapitulate: It has been shown that throughout the 20 years since its inception the pneumatic tube enterprise has gone through those experiences peculiar to all great time-saving inventions or large undertakings which mark distinct advances in our civilization. Its experience, however, has been exceptional in this, that while the Bell telephone and the Morse telegraph had also to go through ordeals that disheartened their projectors and almost wrecked them financially, they had the advantage of dealing with the people rather than, as in the case of the pneumatic tube, with one customer, that executive committee of the people called the Government.

The Government is all right as a customer when the situation is thoroughly understood on both sides, but where doubt exists either in the department or in Congress or, what is far more dangerous, an imperfect knowledge of the facts, then the situation becomes serious, because in any dispute that arises the patriotism of the average man naturally leads him to side with the Government inasmuch as the Government represents him. As a result havoc is frequently wrought more by the mistaken zeal of faithful uninformed public officials reasoning from insufficient data than by the plots and schemes of ill-disposed persons.

The advantage, therefore, of such a commission as you represent is manifest. It would be still greater if such a commission could be made to assume permanent form for having possessed itself of a thorough knowledge of the whole question of the underground transportation—tubes, tunnels, and everything else—it could supervise the extension of this service and its future development to the advantage of the Government and in the meantime protect the interest of all concerned. In this case knowledge is not only power for good but safety for the man, be he a large or small investor, who puts his money into such an enterprise as the tubes.

With a permanent commission in charge, with reasonable, businesslike contracts in operation assuring a fair return on the investment and the certainty of the principal coming back ultimately, there is no reason why the United States should not be provided within the next few years with a scientific system of underground transport in the large cities for handling the mails, parcel post, and deliveries of the shops and stores, no matter how large the volume may be from year to year.

No fair-minded American citizen believes his Government, or any department of it, to be deliberately unjust, and it seems incredible, therefore, that your commission or any other would ever seek to take advantage of an enterprise that has been wrought out with so much laborious effort by depriving those from getting back that which they have put into it either in the form of labor or that expression of accumulated labor which we designate as capital.

BRIEF IN BEHALF OF THE AMERICAN PNEUMATIC SERVICE Co.

I. GOVERNMENT OWNERSHIP.

The more important question of Government ownership is not involved in this issue, inasmuch as the property under consideration is now used exclusively for the performance of a Government function in the transmission of the mails. In fact, these plants were constructed for the sole and exclusive use by the Government, and thus far have been operated under contracts by the owners, the performance of which has been under the supervision of the officials of the Post Office Department. The plants are an essential part of the equipment of the postal service, and could properly have been constructed by the Government originally, and therefore the question of Government ownership of utilities not absolutely essential for Government operation is not involved, for the reason that this equipment is essential for the performance of a function for which the Government was created.

II. ADVANTAGES OF OWNERSHIP BY THE GOVERNMENT.

It would appear wise that the Government should own and operate the equipment which is designed exclusively for its use rather than to have it owned and operated by individuals or corporations. In other words, is it not far more consistent for the purpose of government that this service should be performed by the officers and servants of the people, selected or appointed for that purpose, rather than under contracts with the owners of the equipment?

Under the present system the great mass of mail in our large cities passes from the actual possession of the postal department into the possession of the owners of the tubes, and is transmitted through these lines over which the Government has no control except under the provisions of the contract for service. In this particular branch of the postal service the Government neither owns nor operates the equipment which is used solely for the transmission of the mails. It is conceded, we believe, by all postal officials that these utilities ought to be owned and operated by the Government, and that this should be done, provided these plants can be acquired by purchase for a sum which would not increase the cost of operation to the Government over that now paid the owners for the service furnished. We believe it can be shown conclusively that any fair method adopted for the valuation of these plants would result in a purchase price which the Government could well afford to pay, and which would result in a saving over the amount paid under the contracts.

III. PURCHASE PRICE.

The commission is authorized to investigate the feasibility and desirability of the Government purchasing and operating the equipment for pneumatic-tube service, and also "to ascertain the cost at which such purchase may be made." The purchase price, of course, should be the fair and equitable value of the plants, but in order to determine that question fairly, due consideration must be given to the circumstances under which the plants have been constructed and are now being operated. These plants were built for the sole and exclusive use of the Postal Department; they are adapted for no other use; their value is absolutely limited to such sum as may be obtained as net revenue under contracts with the Government for their use, or such purchase price as the Government may be willing to pay to acquire the properties for its own use. The existing contracts will not expire until 1916, and, if we assume that renewal contracts can be made upon the same terms as those now in force, it is not difficult to determine the value of these plants as going concerns, as the net earnings can be easily ascertained. These earnings for the last completed year under the contract amounted to \$354,629. During that year certain permanent improvements were made to the plants and paid for out of the rentals received. It is fair to say that these permanent improvements amounted to at least \$9,000. That amount added to the net earnings as they appear upon the books would make the total net earnings for the year ending in June, 1912, \$363,629. If we capitalize that sum on a basis of 6 per cent the amount will be \$6,000,000, which would be the value of the plants as going concerns, determined upon the basis of annual net earnings.

If, on the other hand, we take into consideration the value of these plants to the Government after purchase, we find, according to the evidence submitted, that the Government will save \$393,798 annually over and above what it is now paying under the contracts—that is, the Government by an investment of \$6,000,000 will receive therefrom a net revenue amounting to \$393,798, which, capitalized at 6 per cent, amounts to \$6,500,000. These conclusions are reached by well-established methods of determining the value of commercial plants in actual operation.

The actual cost to the owners and their predecessors of building these plants is not easily ascertainable. The cost to the present owner of the securities issued by the corporations owning these plants amounted to \$7,250,000. The actual cost of building these plants can not be ascertained, for the reason that the present owners are not in possession of the figures which will show the cost of building a large part of the plant in New York City. However, neither the original cost nor the reproduction cost would be fair standards of determining the value of these properties. The courts have repeatedly held that original cost or cost of reproduction were not correct criterions to determine the value of a plant in actual operation. In *National Water Works Co. v. Kansas City*, 62 Federal, 853, Justice Brewer, in stating the conclusions of the court, says:

"The original cost of the construction can not control, for 'original cost' and 'present value' are not equivalent terms. Nor would the mere cost of reproducing the waterworks plant be a fair test, because that does not take into account the value which flows from the established connections between the pipes and the buildings of the city." * * *

It is undoubtedly true that if the Government had constructed these plants the cost would have been substantially the same as it has been to the corporations building them.

The Wisconsin Railroad Commission, which has made a very careful study of the elements which ought to enter into the question of valuation, says, in *Hill v. Antigo Water Co.* (3 W. R. C. R., 623) :

“But new plants are seldom paying at the start. Several years are usually required before they obtain a sufficient amount of business or earnings to cover operating expenses, including depreciation and a reasonable rate of interest upon the investment. The amount by which the earnings fail to meet these requirements may thus be regarded as deficits from the operation. These deficits constitute the cost of building up the business of the plant. They are as much a part of the cost of building up the business as loss of interest during the construction of the plant is a part of the cost of its construction.”

Our courts and commissions hold that original cost is not a correct standard by which to determine the value of a plant in operation. On the other hand, there is no decision by any of the courts or commissions which holds that reproduction cost is a proper method of determining the value of a commercial plant in operation. The reproduction cost may be greater or less than the actual cost. It is greater than the actual cost in case of large appreciation in real estate, or in the increase of cost of material and labor, or in the increase of cost of construction due to change of conditions. On the other hand, the reproduction cost may be less than the actual cost, and quite often is, due to the fact that large amounts have been lost in experimentation in efforts to perfect the plant and losses from failure to secure net earnings in the early period of the development of the plant, which deficit constitutes cost of building up the business of the plant.

In all adjudicated cases where the reproduction cost has been taken into consideration a substantial amount has always been added to the cost of reproduction as the value of a “going concern.” (See *National Water Works Co. v. Kansas City*, 62 Fed., 853; *Newburyport Water Co. v. City of Newburyport*, 168 Mass., 542; *Gloucester Water Supply Co. v. City of Gloucester*, 179 Mass., 365; *Town of Bristol v. Bristol & Warren Water Works*, 23 R. I., 274; *Norwich Gas & Electric Light Co. v. City of Norwich*, 75 Conn., 265; *Galena Water Co. v. City of Galena*, 74 Kans., 624; *Kennebec Water District v. City of Waterville*, 97 Me., 185; *Omaha v. Omaha Water Co.*, 218 U. S., 180.)

It is not easy to determine the reproduction cost of these plants. If they were reproduced by private corporations, the expense of securing franchises would have to be taken into consideration, and also the possibility of securing franchises. If reproduced by the Government, the expense of securing franchises is not an element of cost, since no franchise is necessary. Whether reproduced by a private corporation or by the Government, the question of the value of the patents covering the various devices which enter into the plant becomes an element of cost. So in any event the value of the patents should be taken into consideration, and also the actual cost of constructing the plants, which must include also the profit of the contractor who is employed to build them. In other words, the cost of reproduction is the cost to the Government or the corporation of reproducing the plants in substantially the same condition that they are now in, and the profit of the contractor is a part of the cost of the plants. (See *Falmouth v. Falmouth Water Co.*, 180 Mass., 325.)

To this cost of reproduction must be added a substantial per cent to cover the value of the plants as going concerns, as determined by the methods adopted in the cases above cited. What that per cent should be is dependent upon many elements, but more especially upon the net earning basis of the plants in operation. While it may be possible to determine approximately the actual cost of building the plants, there are two elements of cost to be added which are not easily ascertainable. One is the value of patents and the other is the per cent which ought to be added to cover the value of established systems in operation, which the courts refer to as the “value of going concerns.” How much ought to be added to the actual reproduction cost to cover those two elements, we are not prepared to say, but no one can say that these two elements are not of substantial value.

IV. ADVANTAGES OF PURCHASE AT THIS TIME.

The figures presented by the engineers of the American Pneumatic Service Co. indicate that if the Government owned and operated these plants the cost of operation and maintenance would be something like \$400,000 less annually than is now paid as rental to the owners of the plants. If we assume that that is

substantially the saving from Government operation, it would amount in the three years during which the contract has to run to \$1,200,000, or 20 per cent of the cost of the plants at the price of \$6,000,000. If we assume that these figures as to the annual saving be correct, then the saving by the Government in operation over that paid as rental to the owners would within the period of 15 years return to the Government the entire \$6,000,000 paid. More than that, the Government would be in possession and control of its own equipment, and the mails would always be within the possession of the postal department while being transmitted.

If the pneumatic-tube system is to be largely extended in the years to come, as now seems probable, it is far better that these extensions should be made under some settled policy of the postal department rather than under a policy which may have to be changed with the renewing of contracts with the owners made for a limited term of years.

The representatives of the present owners have already stated to the commission the difficulty which they contend with in securing capital necessary to make extensions required by them under the terms of their contracts. Thus far all contracts made with the owners have been for a limited period—in no case exceeding 10 years. It has further been publicly claimed that the Postmaster General had the right to terminate these contracts during the periods for which they were made, even though the owners had faithfully performed all the terms of their contracts. Contracts of such character render it almost impossible for the owners to secure the necessary capital for building large extensions. The difficulty of securing the capital is one of the principal reasons why the owners are desirous of selling these properties to the Government at a price less than their actual cost.

The commission can well understand that, if the owners could enter into a contract with the Government for a long period—say of 40 or 50 years—their rights under which would be fully protected so long as they performed their part of the contract, then it would not be difficult to secure capital to make the required extensions. We assume, however, that it is not likely to be the policy of the Government to favor long-period contracts in connection with pneumatic equipment. The Post Office Department is already committed to the policy of sooner or later acquiring these plants, and it is the desire of the representatives of the owners to deal in an absolutely fair and generous manner with the Government in the matter of the sale and purchase of these properties.

Respectfully submitted.

SAMUEL L. POWERS.

LISTS OF PATENTS, ETC.

AMERICAN PNEUMATIC SERVICE Co.,
Boston, February 7, 1913.

Hon. SIMON GUGGENHEIM,
United States Senate, Washington, D. C.

DEAR SIR: In reply to your letter of February 3 in relation to the list of patents this company submitted to the commission of which you are chairman, this list was prepared by our patent attorneys and in their judgment covers the general field of pneumatic mail-tube transmission. While some of these patents may not seem to apply to apparatus now in use for the Government mail service, it is almost an impossibility to eliminate them from the general field, as they all have a bearing in that field. We considered the complete list of patents furnished you as effective in protecting our methods and apparatus

Very truly yours,

WM. H. AMES, *President.*

PHILADELPHIA, PA., *February 11, 1913.*

Senator SIMON GUGGENHEIM,
*Chairman Commission to Investigate
 Pneumatic Tube Postal System, Washington, D. C.*

DEAR SIR: In conformity with the request contained in yours of the 3d instant, we have had our engineers go over the list of patents submitted by this company to your commission on January 8, 1913, and compile the inclosed list, specifying in detail the particulars in regard to the patents.

It must be taken into consideration that a company such as ours operating a patented system must own not only patents covering the devices actually in use but all others having any bearing thereon in order to be properly protected.

Yours, respectfully,

PNEUMATIC TRANSIT Co.,
Per W. P. J. MURRAY,
Treasurer.

LISTS OF PATENTS THE RIGHTS FOR WHICH WITHIN THE TERRITORY OF PHILADELPHIA AND CAMDEN, N. J., ARE OWNED BY THE PNEUMATIC TRANSIT CO., WITH EXPLANATORY MEMORANDA.

567067. Screen carrier lid of a type formerly used upon the Bourse line.

568291. Pneumatic-tube receiver for terminal points in which the carrier is brought to rest by compressing the air in a normally closed chamber provided with a gate, which is set in operation to permit the exit of the carrier by the pressure created by the carrier in the closed chamber as aforesaid. In use at the central post office, Philadelphia (Bourse line). All gated receivers operate upon this principle.

585498. Pneumatic-tube receiver for use at points other than terminal points, tilting-tube type. Receivers of this type are in operation at the Bourse and Reading Terminal Stations, Philadelphia. This patent covers also a pneumatic-tube transmitter of the rotary type, formerly used upon the Bourse line, Philadelphia, and a time lock of the oil type for governing the interval between the carriers, the time-lock operating upon a principle that characterizes most of those now in use.

585647. Pneumatic circuit closer for enabling a pneumatic-tube carrier to give an indication of its passing a certain point by closing an electric circuit. The special feature of this device is that it is free from projecting parts to be struck by the carrier.

590181. Bearing rings for pneumatic-tube carrier, to fill the space between the shell of the carrier and the tube and take the wear of travel. All carriers used in the mail service are provided with bearing rings made in accordance with principles first disclosed in this patent.

595754. Device for locking the pneumatic-tube transmitter at an intermediate station, actuated by an approaching carrier to prevent the dispatch of a carrier from the station until the first-mentioned carrier has passed.

595755. Pneumatic-tube receiver for intermediate stations automatically selecting and delivering carriers intended for its station while allowing others to pass.

595756. Transmitter for pneumatic tubes, swinging-cradle type. In use at the Bourse and North Philadelphia stations.

602422. Chronograph, used for locating obstructions in pneumatic tubes.

623968. An automatic switch for pneumatic tubes.

623969. A cut-out switch for pneumatic tubes, to be used at intermediate stations when it is desired to temporarily cut them out of operation. Formerly used at the Reading Terminal Station, Philadelphia.

623971. Improvement in mechanism for operating swinging-cradle transmitter, used at the Bourse and North Philadelphia stations.

623972. Lid for pneumatic carrier, used upon the Bourse line, Philadelphia.

623973. Improvement in the pneumatic-tube receiver of the tilting-tube type used at the Reading Station, Philadelphia. This is a standard type for terminal stations where the service is light.

657078. Packing device for annular joint, especially adapted for preventing escape of air in pneumatic-tube apparatus. In use upon swinging-cradle transmitters and tilting-tube receivers, Philadelphia.

657077. Inner carrier for pneumatic-tube carriers, for better protection of mail that is registered.

666175. Closing length for pneumatic tubes used in the construction of all recent lines.

700607. Transmitter for pneumatic tubes, gravity type, a type that is now used almost universally.

706291. Receiver for pneumatic tubes, centrifugal type. Brings the carrier to rest by means of the friction induced by centrifugal force. This receiver permits a very high frequency of dispatch and is especially suitable for busy lines, used extensively in Philadelphia.

707071. Pneumatic time lock for pneumatic tube transmitters.

721476. Apparatus for locating leaks and breaks in pneumatic tubes. Has proven useful on one or two occasions.

722667. Improvements upon the automatically selective receiver covered by patent No. 595755. This is considered one of the most remarkable pieces of

mechanism ever produced. The inventor, Mr. B. C. Batcheller, was awarded a gold medal by the Franklin Institute. It was in operation at the Reading Terminal Station for nearly 10 years, until the present direct line to that station was constructed. In use at the Wall Street Station, New York.

746266. Transmitter for pneumatic tubes, vertical, double-gated type.

746267. Circuit closer for pneumatic tube, to enable the carrier to indicate its passage of a certain point by the closing of an electric circuit.

683022. These two patents are for the receivers of the single-gated type and represent steps in its development toward the standard design now extensively used in New York and elsewhere. These patents disclose principles more or less essential to the operation of the latest single-gated receiver.

635434, 684715, 689043, 742516, 772973, 775949, 784225, 790456, 790457. This group of patents represent the successive steps in the development of the double-gated receiver now in extensive use in New York and elsewhere. The principles disclosed by these patents are all more or less essential to the operation of this type of receiver.

627181, 666747, 726012, 726022, 726097. These patents represent efforts to improve the carrier especially with reference to reducing its friction and increasing its wearing qualities. Carriers of the wheeled type are in use in Boston, though not at present favored.

654690, 698830, 703121. These patents are for devices applicable more particularly to tubes of small diameter, such as might be used to supplement the large tubes.

683141, 683387, 684674, 706639, 742514, 758569, 760658, 760659, 768031, 783151, 800884. This group of patents represent efforts to improve the type of transmitting and receiving mechanism along alternative lines. While none of these devices are at present in use, they may be useful in special cases.

722562, 742390, 768030, 779638, 780595, 796263. This list of patents represent steps in the development of the present highly perfected carrier lid now in universal use upon the mail tube lines.

742513, 742515, 742517. These patents represent modification of the transmitter of the gravity type, first disclosed in patent No. 700607.

782106. Special tachometer carrier for measuring the distance to an obstruction.

1040811. Form of tunnel section for the system of automatic electric dispatch.

1040810. Mounting of electric motor upon the car used in connection with the automatic electric dispatch system.

Serial No. 693974. Buffer for electric dispatch car.

Serial No. 581208. Method of automatic control of electric dispatch cars.

Serial No. 693973. Automatic block system for regulation of electric dispatch cars.

It should be noted that it is principles and not devices that are made the subject of patents, consequently the patented device as finally used may look very different from the drawing in the patent. Furthermore, a device although constructed in strict accordance with a perfectly valid patent may infringe an earlier patent which discloses nothing at all resembling the device in question. For these reasons, it would be difficult to tell which of the foregoing patents are essential to the pneumatic-tube systems as now operated. Only the courts could decide that. It would be still more difficult to say which of them may be required in the future.

REPORT OF AMERICAN AUDIT COMPANY.

PNEUMATIC TRANSIT CO., OF PHILADELPHIA—STATEMENTS OF TOTAL COST OF CONSTRUCTION TO DECEMBER 31, 1912, AND COST OF OPERATING FOR FIVE YEARS ENDED DECEMBER 31, 1912, OF PNEUMATIC-TUBE SERVICE FOR UNITED STATES MAIL IN THE CITY OF PHILADELPHIA, PA.

PHILADELPHIA, PA., *February 14, 1913.*

HON. SIMON GUGGENHEIM,

Chairman Joint Commission of the Senate and House of Representatives of the United States to Investigate the Pneumatic-tube Postal System, Washington, D. C.

SIR: In accordance with the authority contained in your letter of January 17, 1913, we have examined the books and accounts of the Pneumatic Transit Co., of Philadelphia, Pa., in connection with the cost of operating pneumatic-tube mail service for the five years ended December 31, 1912, together with the cost of construction of same.

COST OF OPERATION.

Exhibit A. Summary of operation and profit and loss for the five years ended December 31, 1912.

Exhibit B. Statement of cost of operating pneumatic-tube service for the five years ended December 31, 1912.

The total rental received from the Government during the period under review was \$736,177.57, and the cost of operating same was \$382,160.75, showing a profit to the company of \$354,016.82. From these profits the company deducts the cost of insurance, bond, and other interest, taxes, and depreciation, amounting in all to \$83,886.29, leaving a net profit of \$270,130.53.

Out of these profits the company has paid dividends on preferred stock amounting to \$224,026.

As Exhibits A and B are self-explanatory, it has not been deemed necessary to further comment on the question of operation.

COST OF CONSTRUCTION.

The books of the company show the following charges to construction account:

Bourse Station (common stock).....	\$300, 000. 00
Broad Street Station (bonds).....	200, 000. 00
Stations S and O (preferred stock).....	160, 000. 00
Stations J and C (preferred stock).....	200, 000. 00
Stations S and D (preferred stock).....	235, 000. 00
Reading Terminal Station (preferred stock).....	20, 000. 00
Fairhill and North Philadelphia (preferred stock).....	199, 750. 00
S and O alterations (cash).....	4, 880. 35

Making a total of 1, 319, 630. 35

No information is contained on the books of the company as to the cost of the Bourse Station line, other than \$300,000 par value of common stock was issued to the late William J. Kelly for the construction of this line.

We are informed by Mr. Milholland that the best information obtainable is that the actual cost to Mr. Kelly of the construction of this line was \$42,000, and it so appears in the testimony given before your commission by W. P. J. Murray, the treasurer of the Pneumatic Transit Co.

The cost to the company of the Broad Street line was, as stated above, \$200,000 in bonds of the company. No other information is obtainable from their books. We were informed by Mr. Milholland that the proceeds of these bonds were used to pay debts of the corporation as well as the cost of actual construction. No information is obtainable at this time as to the actual cost of the construction. It appears, however, from the tabulated statements discussed by Mr. Murray before your commission, and appended to his testimony, that the cost of construction amounted to approximately \$60,000.

Lines S and O, J and C, S and D, and Reading Terminal were built under contracts with the Batcheller Pneumatic Tube Co., for which they received \$615,000 par value of preferred stock of the Pneumatic Transit Co., as above noted. An examination of the books of the former company shows that no attempt was made to keep the cost of the construction of these four lines separate. Their books, however, show that a profit of \$176,590.88 was made on this construction.

During the period of the construction the accounts of the Batcheller Co. were under the charge of M. B. Rizzo, who, we are informed, was a defaulter for upward of \$40,000 from the company, and on or about June 4, 1908, was arrested on a charge of forgery and embezzlement. Many of the records, so we have been informed, were destroyed and falsified by this man Rizzo. Public accountants were called in by the company, and the books were straightened up to the best of their ability, and new balances brought down. It is claimed by the company, and it so appears to us, that the records are very incomplete and unreliable, owing to the manipulation just mentioned. It is further claimed by Mr. Milholland that large sums of money which should have been charged to these contracts were omitted. We can only present this matter to you as we found it for your consideration.

The line from Fairhill to North Philadelphia was constructed for the company at a cost of \$199,750 par value of their preferred stock. We submit herewith Exhibit C, cost of construction of tube system, starting from station O to Fairhill, to North Philadelphia Station, which shows the actual cost to have been \$96,793.71. It is claimed by the company that this line was built by their own engineers; that, in addition to the physical conditions being extremely favorable, they were also able to take advantage of an unusual condition in the market and purchase their material at a much less figure than they have been able to do before or since. They therefore claim this particular piece of construction is not a fair one to use as a comparison. The total cost per mile figures \$53,833, as against their engineer's estimate for lines J and C of \$81,350 per mile.

In the engineer's estimate, which we are submitting herewith as Exhibit D, it will be noted that there are charges for "Station equipment" for Broad Street Station and stations J and C amounting to about \$60,000, as against a charge of approximately \$23,000 for "Station equipment" as shown in Exhibit C (Fairhill and North Philadelphia Station). Our conclusions are that only an appraisal of the physical property will give you any authentic information as to the actual cost of this construction.

From the above it will be noted that the charge to construction account on the company's books is approximately \$1,123,000, while the actual direct cost was approximately as follows:

Bourse Station.....	\$42, 000
Broad Street Station.....	60, 000
Stations S and O, J and C, S and D, Reading Terminal Station	439, 000
Fairhill and North Philadelphia.....	97, 000
S and O alterations	5, 000
<hr/>	
Making a total of.....	643, 000

You will understand, of course, that these figures do not include any charges for interest, franchises, etc.

We notice on reading over the testimony given by Mr. Murray before your commission on January 8, 1913, he states that preferred stock amounting to \$996,900 was outstanding at that date. The books of the company show that on December 31, 1912, there was \$103,100 out of a total authorized issue of \$1,000,000 par value preferred stock still in the treasury of the company, leaving the net amount outstanding at that date of \$896,900. Mr. Murray informs us that on or about January 5, 1913, the company authorized the issuance of \$100,000 of the company's preferred stock to be used for obtaining electric tunnel rights for the city of Philadelphia and adjacent territory. This accounts for the difference between the figures shown in his testimony and those appearing on the books at December 31, 1912.

In compiling the figures submitted herewith we have made a careful analysis of the various ledger accounts, but have not made a detailed audit of such data.

We are pleased to say that every facility was given us by the officers and employees of the company to obtain the data submitted herewith. In addition to the books of the Pneumatic Transit Co., they placed at our disposal the books of the Batcheller Pneumatic Tube Co., and also reports of public accountants who had been over their books at various times; otherwise it would have been impossible for us to have completed our examination in the time at our disposal.

Respectfully submitted.
[SEAL.]

THE AMERICAN AUDIT Co.,
By F. W. Rood,
Resident Manager.
THEO. COCHEU, Jr.,
Vice President.
A. F. LAFRENTZ,
Assistant Secretary.

Approved:

Attest:

EXHIBIT A.

Summary of operation and profit and loss for the five years ended December 31st, 1912.

	1908	1909	1910	1911	1912	Total.
Rental from United States Government.....	\$105,609.55	\$135,333.07	\$155,319.14	\$169,917.51	\$169,998.30	\$736,177.57
Power, operating and general expense (see Exhibit B)....	61,134.79	75,122.95	84,167.65	83,296.92	78,438.44	382,160.75
Gross operating profit..	44,474.76	60,210.12	71,151.49	86,620.59	91,559.86	354,016.82
Deduct:						
Insurance.....	119.56	.....	.....	106.66	76.99	303.21
Interest (including \$10,000 bond interest per year).	10,000.00	10,000.00	10,000.00	10,300.41	10,879.29	51,179.70
Taxes.....	1,722.89	2,443.45	2,454.25	2,754.21	2,791.08	12,165.88
Depreciation.....	3,050.00	3,762.50	4,184.39	4,578.11	4,662.50	20,237.50
	14,892.45	16,205.95	16,638.64	17,739.39	18,409.86	83,886.29
Net profit for 5 years ended Dec. 31, 1912...	29,582.31	44,004.17	54,512.85	68,881.20	73,150.00	270,130.53

EXHIBIT B.

Statement of cost of operating pneumatic-tube service for United States mail for the five years ended Dec. 31, 1908, 1909, 1910, 1911, and 1912.

	1908	1909	1910	1911	1912	Total.
Power:						
Electricity purchased.....	\$21,772.63	\$40,620.99	\$42,128.68	\$44,560.31	\$31,235.30	\$180,317.91
Power regulator royalties.....					7,957.72	7,957.72
Total.....	21,772.63	40,620.99	42,128.68	44,560.31	39,193.02	188,275.63
Operating:						
Labor.....	17,373.62	21,976.59	24,971.43	26,602.21	26,060.89	116,984.74
Oil and waste.....	1,387.85	599.43	753.84	705.41	610.69	4,057.22
Linemen's expense.....	117.23	273.65	440.61	369.05	395.20	1,595.74
Wagon service.....	223.50		135.00	184.20	273.50	816.20
Freight and hauling.....	603.73	144.56	258.55	228.51	209.77	1,445.12
Repairs—						
Line.....	280.49	501.26	681.54	883.34	1,624.92	3,971.55
Machinery.....	832.82	1,738.91	1,644.61	1,681.93	3,113.18	9,011.45
Carriers.....	1,715.89	88.55				1,804.44
Shop labor, etc.....	5,719.77	1,291.82	1,598.90	1,075.61	1,570.38	11,256.48
Total.....	28,254.90	26,614.77	30,484.48	31,730.26	33,858.53	150,942.94
General:						
Salaries.....	3,976.54	2,725.25	5,110.13	3,126.25	1,588.97	16,527.14
Postage and stationery....	442.19	180.54	276.58	130.26	115.99	1,145.56
Rent.....	1,845.80	2,377.75	1,856.39	1,637.64	1,937.97	9,655.55
Telephones.....	1,186.66	707.58	1,041.03	612.40	414.78	3,962.45
Miscellaneous.....	1,813.77	993.13	2,300.61	716.26	723.40	6,547.17
Legal expense.....	1,842.30	902.94	969.75	783.54	605.78	5,104.31
Total general.....	11,107.26	7,887.19	11,554.49	7,006.35	5,386.89	42,942.18
Grand total.....	61,134.79	75,122.95	84,167.65	83,296.92	78,438.44	382,160.75

EXHIBIT C.

BATCHELLER PNEUMATIC TUBE CO.

Cost of construction of tube system, starting from Station O to Fairhill, to North Philadelphia Station.

[Constructed in 1910 and 1911.]

ANALYSIS OF CONSTRUCTION ACCOUNT.

Sundry items posted direct:

Mar. 23, 1910, O. J. Evers, cash paid in settlement of contract.....	\$2,000.00
Aug. 1, 1910, petty cash.....	.50
Nov. 30, 1910, petty cash.....	6.49
Dec. 31, 1910, petty cash.....	3.00
Jan. 20, 1911, petty cash.....	32.00
Mar. 31, 1911, petty cash.....	.69
Mar. 31, 1911, correcting entry.....	83.50
	<hr/> \$2,126.18

Operating accounts closed out Mar. 31, 1911:

Rents.....	207.00
General expense.....	776.56
Plant and inspection.....	2,555.20
General supplies.....	64.17
Terminal machinery.....	8,722.64
Power machinery.....	12,305.59
Line materials.....	26,738.24
Street work.....	\$20,928.82
Less credits.....	908.83
	<hr/> 20,019.99
Street contingencies.....	643.74
Manholes.....	1,214.25
Street conduits.....	1,826.26

Operating accounts closed out Mar. 31, 1911—Continued.

Repairing.....	\$1,050.58
Alteration of stations.....	718.23
Piping.....	2,570.64
Wiring.....	426.94
Foundations.....	218.98
Installation of machinery.....	27.55
Stations, miscellaneous.....	26.18
Equipment of stations.....	1,327.20
Freight and hauling.....	4,384.56
Painting.....	51.19
	<hr/>
	\$85,875.69
Contractor's profit, 10 per cent.....	8,791.84
	<hr/>
	96,793.71
Length of line, 1.798 miles.	
Cost per mile (say), \$53,833.	

EXHIBIT D.

PNEUMATIC TRANSIT COMPANY.

Engineer's statement of cost of 8-inch pneumatic tube line connecting the Broad Street Station with Stations J and C, in Philadelphia.

[Constructed in 1907.]

Station equipment (terminal machinery, air compressors, electric motors, etc.):	
Broad Street Station.....	\$20,141.89
Station J.....	24,680.93
Station C.....	14,947.96
	<hr/>
	\$59,770.78
Line materials (tubing, bends, etc.).....	42,954.06
Line work (excavation, laying tubing, repaving, etc.).....	58,853.22
Freight and cartage.....	571.67
Line equipment (carriers, etc.).....	2,200.00
Plans and inspection.....	2,725.33
Office and general expense (rent, bookkeeping, telephones, chief engineer's salary, etc.).....	6,062.15
	<hr/>
	173,137.21
Length of line, 2.1282 miles.	
Estimated cost per mile, \$81,350.	

AMERICAN PNEUMATIC SERVICE COMPANY.

STATEMENTS OF TOTAL COST OF CONSTRUCTION TO DECEMBER 31, 1912, AND COST OF OPERATING FOR FIVE YEARS ENDED MARCH 31, 1912, OF PNEUMATIC-TUBE SERVICE FOR UNITED STATES MAIL IN THE CITIES OF BOSTON, NEW YORK, BROOKLYN, CHICAGO, AND ST. LOUIS.

BOSTON, *February 14, 1913.*

HON. SIMON GUGGENHEIM,
*Chairman Joint Commission of the Senate and
House of Representatives of the United States to
Investigate the Pneumatic-Tube Postal System, Washington, D. C.*

SIR: In accordance with instructions contained in your letter of January 17, 1913, we have made an examination of the books and accounts of the American Pneumatic Service Co., whose home office is at 161 Devonshire Street, Boston, Mass., which company owns and controls either directly or through subsidiary companies the pneumatic-tube service for United States mails in the cities of Boston, New York, Brooklyn, Chicago, and St. Louis. As a result of our examination we submit herewith the following exhibits and schedules, showing the cost of operating the tubes for the five years ended March 31, 1912, and the cost of construction of said tubes to December 31, 1912:

Exhibit A. Summary of operation and profit and loss of subsidiary companies for the five years ended March 31, 1912.

Exhibit B. Statement of cost of operating pneumatic tube service of subsidiary companies for the five years ended March 31, 1912.

Exhibit C. Statement of profit and loss of subsidiary companies for the five years ended March 31, 1912.

Exhibit D. Profit and loss account, Boston Pneumatic Transit Co., for the five years ended March 31, 1912.

Exhibit E. Profit and loss account, New York Pneumatic Service Co., for the five years ended March 31, 1912.

Exhibit F. Profit and loss account, New York Mail & Newspaper Transportation Co., for the five years ended March 31, 1912.

Exhibit G. Profit and loss account, Chicago Pneumatic Tube Co., for the five years ended March 31, 1912.

Exhibit H. Profit and loss account, St. Louis Pneumatic Tube Co., for the five years ended March 31, 1912.

Schedule No. 1. Statement of cost of operating pneumatic-tube service, Boston Pneumatic Transit Co., for the five years ended March 31, 1912.

Schedule No. 2. Statement of cost of operating pneumatic-tube service, New York Pneumatic Service Co., for the five years ended March 31, 1912.

Schedule No. 3. Statement of cost of operating pneumatic-tube service, Chicago Pneumatic Tube Co., for the five years ended March 31, 1912.

Schedule No. 4. Statement of cost of operating pneumatic-tube service, St. Louis Pneumatic Tube Co., for the five years ended March 31, 1912.

Schedule No. 5. Statement of cost of operating pneumatic-tube service of all subsidiary companies for the year ended March 31, 1908.

Schedule No. 6. Statement of cost of operating pneumatic-tube service of all subsidiary companies for the year ended March 31, 1909.

Schedule No. 7. Statement of cost of operating pneumatic-tube service of all subsidiary companies for the year ended March 31, 1910.

Schedule No. 8. Statement of cost of operating pneumatic-tube service of all subsidiary companies for the year ended March 31, 1911.

Schedule No. 9. Statement of cost of operating pneumatic-tube service of all subsidiary companies for the year ended March 31, 1912.

Exhibit I. Summary of construction charges to December 31, 1912.

Exhibit J. Construction charges for Boston tubes to December 31, 1912.

Exhibit K. Construction charges for New York and Brooklyn tubes to December 31, 1912.

Exhibit L. Construction charges for Chicago tubes to December 31, 1912.

Exhibit M. Construction charges for St. Louis tubes to December 31, 1912.

Exhibit N. Tubular Dispatch Co. property, franchises, patents, and construction account.

COST OF OPERATING.

The total income from operations for the five years ended March 31, 1912, was \$3,021,657.02, the direct operating charges were \$1,663,379.21, leaving a gross profit of \$1,358,277.81, to which should be added net income from small tube lines of \$11,692.83, making the gross income from operating \$1,369,970.64. From this amount the company has deducted bond premium, insurance, interest, taxes, and depreciation, amounting to \$1,166,202.58, leaving a net amount credited to their profit and loss account of \$203,768.06.

In connection with the operating accounts, as shown in our exhibits and schedules, we believe the same are self-explanatory and need no further comment other than as to the items charged as bond premiums, amounting to \$23,124.33. We are informed that the parent company is obliged to furnish bonds to the Government for the faithful performance of the contracts for pneumatic-tube mail service. They, in turn, make a charge against the subsidiary companies for these bonds, and, as we understand, this does not represent a cash outlay by the American Pneumatic Service Co., but is an arbitrary charge against the operating companies.

CONSTRUCTION ACCOUNTS.

Exhibit I is a summary of the construction charges to December 31, 1912, as appear on the various ledgers of the subsidiary companies, and shows the total cost of all lines to be as follows:

Boston.....	\$399,585.80
New York and Brooklyn.....	3,244,648.30
Chicago.....	905,188.76
St. Louis.....	149,489.11
Total.....	<u>4,698,911.97</u>

Without considering the parent company's charge for profit and loss, Exhibits J to M show the detail of these construction charges. With the exception of New York and Brooklyn, we were able to obtain the actual construction cost.

Referring to Exhibit K, it will be found that the original construction of the New York and Brooklyn tubes was done under contract by C. J. Ryan & Co. for the Tubular Dispatch Co., and by Belden & Co. for the New York Mail & Newspaper Transportation Co. The Ryan contract was settled for \$590,000, \$100,000 of which was paid in stock. The Belden contract amounted to \$400,000, and was paid \$200,000 in stock and \$200,000 in bonds of the New York Mail & Newspaper Transportation Co. We have therefore been compelled to take these two construction charges to account at their face value, and have included these charges in "Direct Construction" items as shown on Exhibit I.

At the beginning of our examination we were furnished with printed copies of the report of the Pneumatic Tube Commission to the Postmaster General under date of December 10, 1908. Referring to page 48 of this report, we note that the company and committee estimated the cost of constructing the New York and Brooklyn System to have been \$4,534,890.02; the total as shown by us in Exhibits I and K is but \$3,244,648.30, which includes construction charges of very large amounts which had not been made at the date of the printed report referred to. Undoubtedly, the company's and committee's estimate included some, if not all, of the charges shown at that time under "Property, Franchises, Patents and Construction" accounts on the Tubular Dispatch Company's books.

Our Exhibit N shows the detail of the charges to that account, and amount to \$2,143,681.43. We are informed that the Tubular Dispatch Co. went into liquidation, and their assets were sold at public sale. These assets were acquired by the New York Pneumatic Service Co., and the entire capital stock of this latter company, amounting to \$300,000, was issued against same. The New York Pneumatic Service Co. is now known as the Operating Company, and the New York Mail & Newspaper Transportation Co. is the owner of the constructed lines. In showing the cost of the New York and Brooklyn tubes, we have considered the \$590,000 paid to C. J. Ryan & Co. under their contract as a part of this cost.

On referring to the first entry on the New York Mail & Newspaper Transportation Co.'s books, showing cost of property, franchises, patents and construction, we find that 6,050 shares of capital stock was issued to the Tubular Dispatch Co., and the par value, being \$605,000, was charged against cost of construction. We have assumed that this item covers the Ryan contract, and as we have already taken the Ryan contract to account at \$590,000, we take the balance (\$15,000) to account as an additional cost of construction. We have not, however, considered the \$300,000 of capital stock of the New York Pneumatic Service Co., which was issued for the property of the Tubular Dispatch Co. as a charge against cost of construction.

Owing to the extremely limited time given us by your committee to make this examination, we have made a careful analysis of the construction accounts on the books of the American Pneumatic Service Co. and its subsidiary companies, without verifying same by a detailed audit.

We are pleased to say that every facility was afforded us by the officers and employees of the American Pneumatic Service Co. to enable us to arrive at our conclusions.

Respectfully submitted,

[SEAL.]

Approved:

Attest:

H. F. LAFRENTZ, *Assistant Secretary.*

THE AMERICAN AUDIT Co.,
By JAMES W. HALL,
Resident manager.

THEO. COCHEN, Jr., *Vice-president.*

EXHIBIT A.

Summary of operation and profit and loss of subsidiary companies for five years ended Mar. 31, 1912.

	Boston.	New York Mail and Newspaper Transportation Co.	New York.	Chicago.	St. Louis.	Total.
Rentals from United States Government: For year ended Mar. 31—						
1908.....	\$113,089.12	.....	\$119,380.31	\$122,813.81	\$32,953.21	\$388,236.45
1909.....	113,089.11	.....	246,732.06	125,970.00	33,090.49	518,881.66
1910.....	113,965.13	.....	367,578.57	138,690.25	33,090.49	653,324.44
1911.....	115,158.00	.....	397,004.49	156,498.60	33,090.50	701,751.59
1912.....	115,158.00	.....	449,927.99	161,286.39	33,090.50	759,462.88
	570,459.36	.....	1,580,623.42	705,259.05	165,315.19	3,021,657.02
Power, operating, repair shops and general expenses: For year ended Mar. 31—						
1908.....	67,905.86	.....	101,919.16	73,631.12	24,120.34	267,576.48
1909.....	61,214.06	.....	159,730.45	62,269.13	19,105.02	302,318.66
1910.....	55,909.99	.....	193,990.03	64,956.54	18,544.95	333,401.51
1911.....	52,430.30	.....	244,474.38	71,549.91	19,078.45	387,533.04
1912.....	46,290.64	.....	234,565.00	75,164.35	16,529.53	372,549.52
Per Exhibit B.....	283,750.85	.....	934,679.02	347,571.05	97,378.29	1,663,379.21
Gross operating profit: For year ended Mar. 31—						
1908.....	45,183.26	.....	17,461.15	49,182.69	8,832.87	120,659.97
1909.....	51,875.05	.....	87,001.61	63,700.87	13,985.47	216,563.00
1910.....	58,055.14	.....	173,588.54	73,733.71	14,545.54	319,922.93
1911.....	62,727.70	.....	152,530.11	84,948.69	14,012.05	314,218.55
1912.....	68,867.36	.....	215,362.99	86,122.04	16,560.97	386,913.36
	286,708.51	.....	645,944.40	357,688.00	67,936.90	1,358,277.81
Net income from small tube lines: For year ended Mar. 31—						
1908.....	1,696.96	.....	.....	.....	.....	1,696.96
1909.....	2,682.37	.....	.....	.....	.....	2,682.37
1910.....	2,436.00	.....	.....	.....	.....	2,436.00
1911.....	2,436.00	.....	.....	.....	.....	2,436.00
1912.....	2,441.50	.....	.....	.....	.....	2,441.50
	11,692.83	.....	.....	.....	.....	11,692.83
Miscellaneous charges against gross operating profit for bond premiums: For year ended Mar. 31—						
1908.....	565.45	.....	2,400.40	1,104.26	205.58	4,275.69
1909.....	565.44	.....	2,400.36	1,472.28	274.08	4,712.16
1910.....	565.44	.....	2,400.36	1,472.28	274.08	4,712.16
1911.....	565.44	.....	2,400.36	1,472.28	274.08	4,712.16
1912.....	565.44	.....	2,400.36	1,472.28	274.08	4,712.16
	2,827.21	.....	12,001.84	6,993.38	1,301.90	23,124.33
Insurance: For year ended Mar. 31—						
1908.....	366.51	.....	269.79	390.96	84.53	1,111.79
1909.....	592.79	.....	342.31	497.87	105.17	1,538.14
1910.....	542.27	.....	667.32	456.37	100.27	1,766.23
1911.....	445.55	.....	497.28	405.67	96.99	1,445.49
1912.....	595.32	.....	1,381.84	443.83	119.54	2,540.53
	2,542.44	.....	3,158.54	2,194.70	506.50	8,402.18
Interest (including \$10,000 bond interest per year): For year ended Mar. 31—						
1908.....	25,919.94	\$29,936.77	1,315.34	54,053.57	18,802.98	130,028.60
1909.....	25,509.48	49,022.66	67.07	50,594.67	18,850.60	143,910.34
1910.....	23,306.71	50,475.72	2,329.58	48,861.96	18,786.46	143,760.43
1911.....	21,517.87	133,036.32	2,839.84	48,500.65	11,605.41	217,500.09
1912.....	20,266.07	141,006.06	778.46	48,907.35	12,049.56	221,450.58
	116,520.07	403,477.53	5,639.23	250,918.20	80,095.01	856,650.04

EXHIBIT A—Continued.

Summary of operation and profit and loss of subsidiary companies for five years ended Mar. 31, 1912—Continued.

	Boston.	New York Mail and Newspaper Transportation Co.	New York.	Chicago.	St. Louis.	Total.
Taxes:						
For year ended Mar. 31—						
1908.....	\$1,086.84	.....	\$3,040.21	\$4,566.04	\$2,726.68	\$11,419.77
1909.....	1,404.21	.....	3,158.58	6,340.27	2,473.69	13,376.75
1910.....	984.99	.....	5,691.39	6,453.32	2,798.96	15,928.66
1911.....	1,816.94	.....	8,435.03	8,374.17	2,669.07	21,295.21
1912.....	2,524.39	.....	10,540.48	8,384.66	2,706.11	24,155.64
	7,817.37	.....	30,865.69	34,118.46	13,374.51	86,176.03
Depreciation:						
For year ended Mar. 31—						
1908.....	.....	.....	.....	38,370.00	.....	38,370.00
1909.....	.....	.....	.....	38,370.00	.....	38,370.00
1910.....	.....	.....	.....	38,370.00	.....	38,370.00
1911.....	.....	.....	.....	38,370.00	.....	38,370.00
1912.....	.....	.....	.....	38,370.00	.....	38,370.00
	.....	.....	.....	191,850.00	.....	191,850.00

SUMMARY FOR FIVE YEARS ENDED MAR. 31, 1912.

Rental from United States Government.....	\$570,459.36	.....	\$1,580,623.42	\$705,259.05	\$165,315.19	\$3,021,657.02
Power, operating, repair shops, and general expense.	283,750.85	.....	934,679.02	347,571.05	97,378.29	1,663,379.21
Gross operating profit..	226,708.51	.....	645,944.40	357,638.00	67,936.90	1,358,277.81
Net income from small tube lines.....	11,692.83	.....	.....	.....	.....	11,692.83
	298,401.34	.....	645,944.40	357,638.00	67,936.90	1,369,970.64
Deduct:						
Bond premiums.....	2,827.21	.....	12,001.84	6,993.38	1,301.90	23,124.33
Insurance.....	2,542.44	.....	3,158.54	2,194.70	506.50	8,402.18
Interest (including \$10,000 bond interest per year)..	116,520.07	\$403,477.53	5,639.23	250,918.20	80,095.01	856,650.04
Taxes.....	7,817.37	.....	30,865.69	34,118.46	13,374.51	86,176.03
Depreciation.....	.....	.....	.....	191,850.00	.....	191,850.00
	129,707.09	403,477.53	51,665.30	486,074.74	95,277.92	1,166,202.58
Net profit for 5 years ended Mar. 31, 1912...	168,694.25	.....	190,801.57	128,386.74	27,341.02	203,768.06

Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the five years ended Mar. 31, 1912.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$38,203.01	\$176,435.67	\$52,271.27	\$18,175.65	\$285,085.60
Electric power purchased...	58,334.12	219,445.08	51,673.89	.....	329,453.09
Fuel.....	1,048.39	.....	.....	.....	1,048.39
Rent, light, and heat.....	107.90	4,824.64	45.21	.....	4,977.75
Oil and waste.....	1,772.13	4,666.53	1,178.88	497.38	8,114.92
Engine and boiler room labor.....	10,048.15	36,479.09	13,055.87	9,243.36	68,826.47
Engine and boiler room supplies.....	163.63	317.69	445.98	118.37	1,045.67
Signal wires.....	293.12	1,272.76	182.65	.....	1,748.53
Repairs—					
Power plant and piping.	1,310.65	2,674.62	2,224.73	390.21	6,600.21
Compressors and blowers.....	96.12	571.53	287.89	13.89	969.43
Buildings.....	.....	.....	229.64	.....	229.64
Total.....	111,377.22	446,687.61	121,596.01	28,438.86	708,099.70

EXHIBIT A—Continued.

Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the five years ended Mar. 31, 1912.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Operating:					
Labor.....	\$79,165.17	\$241,324.34	\$94,085.29	\$19,893.58	\$434,468.38
Supplies.....	765.83	707.26	706.84	309.63	2,489.56
Oil and waste.....	1,825.57	2,196.45	1,732.31	454.78	6,209.11
Rent, light, and heat.....	446.45	46.20	341.29	1,800.00	2,633.94
Inspection.....	14,821.38	18,302.27	21,677.78	9,040.19	63,841.62
Automobile expense.....	219.32				219.32
Mail teams.....	778.91	3,021.65	3,124.58	666.75	7,591.89
Traveling and miscellaneous.....	3,961.60	5,277.54	2,941.45	1,403.42	13,584.01
Fines.....	59.64	710.61	5,717.22	113.57	6,601.04
Repairs—					
Tubes.....	1,315.66	11,039.92	2,170.18	786.26	15,312.02
Terminal machinery.....	2,033.87	7,088.07	6,249.96	302.69	15,674.59
Carriers.....	27,557.39	61,165.84	30,804.70	6,440.42	125,968.35
Buildings and fixtures.....	120.40	120.65	450.82	3.93	695.80
Extraordinary.....	9,168.91	47,172.02	8,176.41	6,650.49	71,167.83
Total.....	142,240.10	398,172.82	178,178.83	47,865.71	766,457.46
Repair shop:					
Materials.....			.25		.25
Indirect labor.....		92.74	1,098.52	119.57	1,310.83
Expense—					
Supplies.....		23.92	16.75	12.22	52.89
Tools used.....		349.25	160.72	58.81	568.78
Telephone and telegraph.....		9.30			9.30
Rent, light, heat, and power.....		1,309.30	881.00		2,190.30
Repairs—					
Machinery and tools.....		26.13	9.02	.63	35.78
Buildings and fixtures.....		9.17	8.63		17.80
Teaming.....		22.50	44.72	25.61	92.83
Experimental work.....		2.40		26.00	28.40
Miscellaneous.....		16.44	4.74		21.18
Freight and express.....		.29	34.54	11.07	45.90
Total.....		1,861.44	2,258.89	253.91	4,374.24
General expense:					
Salaries.....	24,716.44	47,202.53	29,559.09	12,508.28	113,986.34
Postage and stationery.....	138.12	601.17	648.57	202.79	1,590.65
Traveling.....	57.61	3,891.62	3,953.76	968.73	8,871.72
Telephone and telegraph.....	2,499.83	13,043.02	3,191.72	889.66	19,624.23
Rent, light, and heat.....	1,500.00	1,409.92	1,510.00	1,500.00	5,919.92
Fines.....	8.00	280.00	216.83	2.00	506.83
Legal.....		17,385.55	3,851.25	3,000.00	24,236.80
Patent expense.....		39.00			39.00
Miscellaneous.....	825.50	2,906.85	2,256.42	1,643.53	7,632.30
Directors' fees.....	75.00	330.00	75.00	20.00	500.00
Bonus on operating.....	313.03	867.49	274.68	84.82	1,540.02
Total.....	30,133.53	87,957.15	45,537.32	20,819.81	184,447.81
Grand total.....	283,750.85	934,679.02	347,571.05	97,378.29	1,663,379.21

EXHIBIT C.

American Pneumatic Service Co., Boston, Mass.—Combined statement of profit and loss of subsidiary companies for the five years ended Mar. 31, 1912.

Debits.	Credits.
Other expenses for the year ended Mar. 31, 1908:	Rentals from United States Government for the year ended Mar. 31, 1908 (see Exhibit A).....
Bond premiums..... \$4,275.69	..... \$388,236.45
Insurance..... 1,111.79	Less cost of power, operating, repair shop, and general expense, Schedule No. 5.....
Interest..... 130,028.60	..... 267,576.48
Taxes..... 11,419.77	
..... 146,835.85	Gross operating profit for the year ended Mar. 31, 1908....
	..... 120,659.97
Other expenses for the year ended Mar. 31, 1909:	Rentals from United States Government for the year ended Mar. 31, 1909 (See Exhibit A).....
Bond premiums..... 4,712.16	..... 518,881.66
Insurance..... 1,538.14	Less cost of power, operating, repair shop, and general expense, Schedule No. 6.....
Interest..... 143,910.34	..... 302,318.66
Taxes..... 13,376.75	
..... 163,537.39	Gross operating profit for the year ended Mar. 31, 1909.....
	..... 216,563.00

EXHIBIT C—Continued.

American Pneumatic Service Co., Boston, Mass., etc.—Continued.

Debits.	Credits.
Other expenses for the year ended Mar. 31, 1910: Bond premiums..... \$4,712.16 Insurance..... 1,766.23 Interest..... 143,760.43 Taxes..... 15,928.66 166,167.48	Rentals from United States Government for the year ended Mar. 31, 1910 (see Exhibit A)..... \$653,324.44 Less cost of power, operating, repair shop, and general expense, Schedule No. 7..... 333,401.51 Gross operating profit for the year ended Mar. 31, 1910..... 319,922.93
Other expenses for the year ended Mar. 31, 1911: Bond premiums..... 4,712.16 Insurance..... 1,445.49 Interest..... 217,500.09 Taxes..... 21,295.21 244,952.95	Rentals from United States Government for the year ended Mar. 31, 1911 (see Exhibit A)..... 701,751.59 Less cost of power, operating, repair shop, and general expense, Schedule No. 8..... 387,533.04 Gross operating profit for the year ended Mar. 31, 1911..... 314,218.55
Other expenses for the year ended Mar. 31, 1912: Bond premiums..... 4,712.16 Insurance..... 2,540.53 Interest..... 221,450.58 Taxes..... 24,155.64 252,858.91	Rentals from United States Government for the year ended Mar. 31, 1912 (see Exhibit A)..... 759,462.88 Less cost of power, operating, repair shop, and general expense, Schedule No. 9..... 372,549.52 Gross operating profit for the year ended Mar. 31, 1912..... 386,913.36
Rentals of leased lines, New York Pneumatic Service Co.: For the year ended Mar. 31— 1908..... 10,000.00 1909..... 54,721.05 1910..... 118,079.03 1911..... 115,310.55 1912..... 170,714.47 468,825.10	Other sources of income: Small tube lines, Mar. 31, 1908..... 3,291.00 Less cost of maintenance..... 1,594.04 1,696.96 Small tube lines, Mar. 31, 1909..... 3,000.68 Less cost of maintenance..... 318.31 2,682.37 Small tube lines, Mar. 31, 1910..... 2,736.00 Less cost of maintenance..... 300.00 2,436.00 Small tube lines, Mar. 31, 1911..... 2,736.00 Less cost of maintenance..... 300.00 2,436.00 Small tube lines, Mar. 31, 1912..... 2,742.00 Less cost of maintenance..... 300.50 2,441.50 Total profit operating small tube lines for the 5 years ended Mar. 31, 1912..... 11,692.83
Depreciation, Chicago Pneumatic Tube Co.: For the year ended Mar. 31— 1908..... 38,370.00 1909..... 38,370.00 1910..... 38,370.00 1911..... 38,370.00 1912..... 38,370.00 191,850.00	Lease rentals received, New York Mail & Newspaper Transportation Co.: For year ended Mar. 31— 1908..... 10,000.00 1909..... 54,721.05 1910..... 118,079.03 1911..... 115,310.55 1912..... 170,714.47 468,825.10
Balance, operating profit for the 5 years ended Mar. 31, 1912..... 203,768.06 1,838,795.74	1,838,795.74

EXHIBIT D.

Boston Pneumatic Transit Co., Boston, Mass.—Profit and loss account for the 5 years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

Debits.		Credits.	
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1908:		Rental from United States Government for the year ended Mar. 31, 1908.....	\$113,089.12
Bond premiums.....	\$565.45	Less cost of power, operating and general expense, Schedule No. 1.....	67,905.86
Insurance.....	366.51		
Interest.....	25,919.94		
Taxes.....	1,086.84		
	<u>27,938.74</u>	Gross operating profit for the year ended Mar. 31, 1908.....	<u>45,183.26</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1909:		Rental from United States Government for the year ended Mar. 31, 1909.....	113,089.11
Bond premiums.....	565.44	Less cost of power, operating and general expense, Schedule No. 1.....	61,214.06
Insurance.....	592.79		
Interest.....	25,509.48		
Taxes.....	1,404.21		
	<u>28,071.92</u>	Gross operating profit for the year ended Mar. 31, 1909.....	<u>51,875.05</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1910:		Rental from United States Government for the year ended Mar. 31, 1910.....	113,965.13
Bond premiums.....	565.44	Less cost of power, operating and general expense, Schedule No. 1.....	55,909.99
Insurance.....	542.27		
Interest.....	23,306.71		
Taxes.....	984.99		
	<u>25,399.41</u>	Gross operating profit for the year ended Mar. 31, 1910.....	<u>58,055.14</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1911:		Rental from United States Government for the year ended Mar. 31, 1911.....	115,158.00
Bond premiums.....	565.44	Less cost of power, operating and general expense, Schedule No. 1.....	52,430.30
Insurance.....	445.55		
Interest.....	21,517.87		
Taxes.....	1,816.94		
	<u>24,345.80</u>	Gross operating profit for the year ended Mar. 31, 1911.....	<u>62,727.70</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1912:		Rental from United States Government for the year ended Mar. 31, 1912.....	115,158.00
Bond premiums.....	565.44	Less cost of power, operating and general expense, Schedule No. 1.....	46,290.64
Insurance.....	595.32		
Interest.....	20,266.07		
Taxes.....	2,524.39		
	<u>23,951.22</u>	Gross operating profit for the year ended Mar. 31, 1912.....	<u>68,867.36</u>
Balance, net operating profit, for the 5 years ended Mar. 31, 1912.....	168,694.25	Other sources of income:	
		Small tube lines, Mar. 31, 1908.....	\$3,291.00
		Less cost of maintenance.....	1,594.04
			<u>1,696.96</u>
		Small tube lines, Mar. 31, 1909.....	3,000.68
		Less cost of maintenance.....	318.31
			<u>2,682.37</u>
		Small tube lines, Mar. 31, 1910.....	2,736.00
		Less cost of maintenance.....	300.00
			<u>2,436.00</u>
		Small tube lines, Mar. 31, 1911.....	2,736.00
		Less cost of maintenance.....	300.00
			<u>2,436.00</u>
		Small tube lines, Mar. 31, 1912.....	2,742.00
		Less cost of maintenance.....	300.50
			<u>2,441.50</u>
		Total profit operating small tube lines for the 5 years ended Mar. 31, 1912.....	<u>11,692.83</u>
	<u>298,401.34</u>		<u>298,401.34</u>

EXHIBIT E.

New York Pneumatic Service Co., New York, N. Y.—Profit and loss account for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

Debits.		Credits.	
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1908:		Rental from United States Government for the year ended Mar. 31, 1908.....	\$119,380.31
Bond premiums.....	\$2,400.40	Less cost of power, operating, repair shop, and general expense, Schedule No. 2.....	101,919.16
Insurance.....	269.79		
Interest.....	1,315.34		
Taxes.....	3,040.21		
	<u>7,025.74</u>	Gross operating profit for the year ended Mar. 31, 1908.....	<u>17,461.15</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1909:		Rental from United States Government for the year ended Mar. 31, 1909.....	246,732.06
Bond premiums.....	2,400.36	Less cost of power, operating, repair shop, and general expense, Schedule No. 2.....	159,730.45
Insurance.....	342.31		
Interest.....	67.07		
Taxes.....	3,158.58		
	<u>5,834.18</u>	Gross operating profit for the year ended Mar. 31, 1909.....	<u>87,001.61</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1910:		Rental from United States Government for the year ended Mar. 31, 1910.....	367,578.57
Bond premiums.....	2,400.36	Less cost of power, operating, repair shop, and general expense, Schedule No. 2.....	193,990.03
Insurance.....	667.32		
Interest.....	2,329.58		
Taxes.....	5,691.39		
	<u>11,088.65</u>	Gross operating profit for the year ended Mar. 31, 1910.....	<u>173,588.54</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1911:		Rental from United States Government for the year ended Mar. 31, 1911.....	397,004.49
Bond premiums.....	2,400.36	Less cost of power, operating, repair shop, and general expense, Schedule No. 2.....	244,474.38
Insurance.....	497.28		
Interest.....	2,839.84		
Taxes.....	8,435.03		
	<u>14,172.51</u>	Gross operating profit for the year ended Mar. 31, 1911.....	<u>152,530.11</u>
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1912:		Rental from United States Government for the year ended Mar. 31, 1912.....	449,927.99
Bond premiums.....	2,400.36	Less cost of power, operating, repair shop, and general expense, Schedule No. 2.....	234,565.00
Insurance.....	1,381.84		
Interest.....	778.46		
Taxes.....	10,540.48		
	<u>13,544.22</u>	Gross operating profit for the year ended Mar. 31, 1912.....	<u>215,362.99</u>
Rentals of leased lines:			
For the year ended Mar. 31—			
1908.....	10,000.00		
1909.....	54,721.05		
1910.....	118,079.03		
1911.....	115,310.55		
1912.....	170,714.47		
	<u>468,825.10</u>		
	<u>520,490.40</u>		
Balance, net operating profit for the 5 years ended Mar. 31, 1912.....	125,454.00		
	<u>645,944.40</u>		<u>645,944.40</u>

EXHIBIT F.

New York Mail & Newspaper Transportation Co., New York, N. Y.—Profit and loss account for five years ended March 31, 1908, 1909, 1910, 1911, and 1912.

Debits.		Credits.
Expenses for the year ended Mar. 31, 1908:		Lease rental received for the year ended Mar. 31, 1908.....
Bond interest.....	\$10,000.00	\$10,000.00
Interest.....	19,936.77	Lease rentals received for the year ended Mar. 31, 1909.....
	29,936.77	54,721.05
Expenses for the year ended Mar. 31, 1909:		Lease rentals received for the year ended Mar. 31, 1910.....
Bond interest.....	10,000.00	118,079.03
Interest.....	39,022.66	Lease rentals received for the year ended Mar. 31, 1911.....
	49,022.66	115,310.55
Expenses for the year ended Mar. 31, 1910:		Lease rentals received for the year ended Mar. 31, 1912.....
Bond interest.....	10,000.00	170,714.47
Interest.....	40,475.72	
	50,475.72	
Expenses for the year ended Mar. 31, 1911:		
Bond interest.....	10,000.00	
Interest.....	123,036.32	
	133,036.32	
Expenses for the year ended Mar. 31, 1912:		
Bond interest.....	10,000.00	
Interest.....	131,006.06	
	141,006.06	
Balance, net profit for the 5 years ended Mar. 31, 1912.....	65,347.57	
	468,825.10	468,825.10

EXHIBIT G.

Chicago Pneumatic Tube Co., Chicago, Ill.—Profit and loss account for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

Debits.		Credits.
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1908:		Rental from United States Government for the year ended Mar. 31, 1908.....
Bond premiums.....	\$1,104.26	\$122,813.81
Insurance.....	390.96	Less:
Interest.....	54,053.57	Cost of power, operating, repair shop, and general expense, schedule No. 3.....
Taxes.....	4,566.04	73,631.12
	60,114.83	Gross operating profit for the year ended Mar. 31, 1908.....
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1909:		49,182.69
Bond premiums.....	1,472.28	Rental from United States Government for the year ended Mar. 31, 1909.....
Insurance.....	497.87	125,970.00
Interest.....	50,594.67	Less:
Taxes.....	6,340.27	Cost of power, operating, repair shop, and general expense, schedule No. 3.....
	58,905.09	62,269.13
		Gross operating profit for the year ended Mar. 31, 1909.....
		63,700.87

EXHIBIT H.

St. Louis Pneumatic Tube Co., St. Louis, Mo.—Profit and loss account for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

Debits.		Credits.	
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1908:		Rental from United States government for the year ended Mar. 31, 1908.....	\$32,953.21
Bond premiums.....	\$205.58	Less cost of power, operating, repair shop and general expense, schedule No. 4.....	24,120.34
Insurance.....	84.53		
Interest.....	18,802.98		
Taxes.....	2,726.68		
	21,819.77	Gross operating profit for the year ended Mar. 31, 1908.....	8,832.87
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1909:		Rental from United States Government for the year ended Mar. 31, 1909.....	33,090.49
Bond premiums.....	274.08	Less cost of power, operating, repair shop and general expense, schedule No. 4.....	19,105.02
Insurance.....	105.17		
Interest.....	18,850.60		
Taxes.....	2,473.69		
	21,703.54	Gross operating profit for the year ended Mar. 31, 1909.....	13,985.47
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1910:		Rental from United States Government for the year ended Mar. 31, 1910.....	33,090.49
Bond premiums.....	274.08	Less cost of power, operating, repair shop and general expense, schedule No. 4.....	18,544.95
Insurance.....	100.27		
Interest.....	18,786.46		
Taxes.....	2,798.96		
	21,959.77	Gross operating profit for the year ended Mar. 31, 1910.....	14,545.54
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1911:		Rental from United States Government for the year ended Mar. 31, 1911.....	33,090.50
Bond premiums.....	274.08	Less cost of power, operating, repair shop and general expense, schedule No. 4.....	19,078.45
Insurance.....	96.99		
Interest.....	11,605.41		
Taxes.....	2,669.07		
	14,645.55	Gross operating profit for the year ended Mar. 31, 1911.....	14,012.05
Miscellaneous charges against gross operating profit for the year ended Mar. 31, 1912:		Rental from United States Government for the year ended Mar. 31, 1912.....	33,090.50
Bond premiums.....	274.08	Less cost of power, operating, repair shop and general expense, schedule No. 4.....	16,529.53
Insurance.....	119.54		
Interest.....	12,049.56		
Taxes.....	2,706.11		
	15,149.29	Gross operating profit for the 5 years ended Mar. 31, 1912.....	16,560.97
	95,277.92	Balance, net operating loss, for the 5 years ended Mar. 31, 1912.....	27,341.02
			95,277.92

EXHIBIT H—Continued.

SCHEDULE 1.

Boston Pneumatic Transit Co., Boston, Mass.—Statement of cost of operating pneumatic-tube service for United States mail for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

	1908	1909	1910	1911	1912	Total.
Power:						
Electricity purchased.....	\$14,422.35	\$14,284.97	\$10,931.70	\$9,662.74	\$9,032.36	\$58,334.12
Fuel.....	1,067.90	19.51	-----	-----	-----	1,048.39
Steam purchased.....	8,400.00	8,400.00	8,400.00	7,283.30	5,719.71	38,203.01
Rent, light, and heat.....	98.80	5.50	3.60	-----	-----	107.90
Oil and waste.....	249.52	442.39	345.46	432.75	302.01	1,772.13
Engine room, labor.....	2,130.81	2,064.77	1,905.84	1,955.97	1,990.76	10,048.15
Engine and boiler rooms, supplies.....	54.65	43.90	23.18	19.88	22.02	163.63
Signal wires.....	-----	-----	-----	138.96	154.16	293.12
Repairs—						
Power plant and piping....	165.27	76.25	610.73	407.13	51.27	1,310.65
Compressors and blowers...	73.03	23.09	-----	-----	-----	96.12
Total power.....	26,662.33	25,321.36	22,220.51	19,900.73	17,272.29	111,377.22
Operating:						
Labor.....	16,471.08	16,235.69	15,988.03	15,597.71	14,872.66	79,165.17
Supplies.....	202.57	219.63	122.47	112.17	108.99	765.83
Oil and waste.....	956.61	217.16	193.16	179.63	233.82	1,825.57
Rent, light, and heat.....	277.98	183.46	30.20	-----	-----	446.45
Inspection.....	3,455.39	3,169.75	2,696.61	2,659.09	2,840.54	14,821.38
Automobile expense.....	-----	-----	-----	-----	219.32	219.32
Mail teams.....	284.85	117.07	138.10	113.97	124.92	778.91
Traveling and miscellaneous...	2,925.91	393.67	261.96	209.41	170.65	3,961.60
Fines.....	46.64	12.00	1.00	-----	-----	59.64
Repairs—						
Tubes.....	361.49	72.74	58.91	275.86	546.66	1,315.66
Terminal machinery.....	731.40	185.38	408.26	460.82	248.01	2,033.87
Carriers.....	8,624.69	5,960.02	4,803.00	3,408.28	4,761.40	27,557.39
Buildings and fixtures.....	35.54	-----	77.18	3.75	3.93	120.40
Extraordinary.....	1,000.00	2,400.00	2,400.00	2,632.06	736.85	9,168.91
Total operating.....	35,374.15	29,166.57	27,178.88	25,652.75	24,867.75	142,240.10
General:						
Salaries.....	4,858.72	5,443.93	5,688.53	5,798.68	2,926.58	24,716.44
Postage and stationery.....	20.00	12.43	44.12	58.12	3.45	138.12
Traveling.....	15.81	10.80	18.40	12.60	-----	57.61
Telegraph and telephone.....	443.00	551.97	439.10	531.38	534.38	2,499.83
Rent, light, and heat.....	300.00	300.00	300.00	300.00	300.00	1,500.00
Miscellaneous.....	231.85	407.00	20.45	126.04	40.16	825.50
Fines.....	-----	-----	-----	6.00	2.00	8.00
Bonus on operating.....	-----	-----	-----	44.00	269.03	313.03
Directors' fees.....	-----	-----	-----	-----	75.00	75.00
Total general.....	5,869.38	6,726.13	6,510.60	6,876.82	4,150.60	30,133.53
Grand total (power, operating, and general expense).....	67,905.86	61,214.06	55,909.99	52,430.30	46,290.64	283,750.85

EXHIBIT H—Continued.

SCHEDULE 2.

New York Pneumatic Service Co., New York, N. Y.—Statement of cost of operating pneumatic tube service for United States mail for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

	1908	1909	1910	1911	1912	Total.
Power:						
Steam power purchased.....	\$44,679.94	\$36,853.34	\$31,701.26	\$35,337.23	\$27,863.90	\$176,435.67
Electric power purchased.....		31,896.99	57,671.68	61,527.11	68,349.30	219,445.08
Oil and waste.....	271.89	573.35	1,163.63	1,177.36	1,480.30	4,666.53
Rent, light, and heat.....	1,560.00	1,480.00	602.50	582.14	600.00	4,824.64
Engine room, labor.....	7,430.52	7,097.20	7,465.27	7,118.65	7,367.45	36,479.09
Engine and boiler room, supplies.....	79.62	16.17	58.31	81.67	81.92	317.69
Signal wires.....				563.26	709.50	1,272.76
Repairs—						
Power plant and piping....	52.85	69.40	369.71	661.67	1,520.99	2,674.62
Compressors and blowers...	170.89	400.12		.52		571.53
Total power.....	54,245.71	78,386.57	99,032.36	107,049.61	107,973.36	446,687.61
Operating:						
Labor.....	22,651.92	40,993.23	54,419.34	57,915.45	65,344.40	241,324.34
Supplies.....	213.10	74.30	156.82	181.20	81.84	707.26
Oil and waste.....	356.89	438.08	552.83	471.89	376.76	2,196.45
Rent, light, and heat.....			16.70	22.30	7.20	46.20
Inspection.....	2,658.20	2,867.61	3,725.98	4,214.29	4,836.19	18,302.27
Mail teams.....	867.20	1,787.85	91.35	151.25	124.00	3,021.65
Traveling and miscellaneous...	566.47	1,041.37	1,179.31	1,213.63	1,276.76	5,277.54
Fines.....	516.45	134.16	60.00			710.61
Repairs—						
Tubes.....	2,313.12	5,788.66	388.01	991.56	1,558.57	11,039.92
Terminal machinery.....	575.54	345.42	1,338.34	1,662.80	3,165.97	7,088.07
Carriers.....	5,578.74	7,962.87	12,447.33	12,055.00	23,121.90	61,165.84
Buildings and fixtures.....	13.32	5.10	5.36	66.43	30.44	120.65
Extraordinary.....	143.41	1,750.00	2,100.00	40,179.45	2,999.16	47,172.02
Total operating.....	36,454.36	63,188.65	76,481.37	119,125.25	102,923.19	398,172.82
Repair shop:						
Indirect labor.....		1.47	91.27			92.74
Expense—						
Supplies.....					23.92	23.92
Tools used.....	119.52	11.46	24.31	63.30	130.66	349.25
Telephone and telegraph.....	4.35	4.95				9.30
Rent, light, heat, and power....	381.40	927.90				1,309.30
Repairs—						
Machinery and tools.....	18.13		8.00			26.13
Buildings and fixtures.....					9.17	9.17
Teaming.....				2.75	19.75	22.50
Experimental work.....			2.40			2.40
Miscellaneous.....	16.44					16.44
Freight and express.....					.29	.29
Total repair shop.....	523.40	962.22	125.98	66.05	183.79	1,861.44
General expense:						
Salaries.....	7,505.35	7,376.13	9,147.11	9,579.94	13,594.00	47,202.53
Postage and stationery.....	186.01	84.60	51.20	136.97	142.39	601.17
Traveling.....	374.97	1,309.18	527.20	934.77	745.50	3,891.62
Telephone and telegraph.....	1,279.52	2,023.64	2,778.01	3,221.65	3,740.20	13,043.02
Rent, light, and heat.....	52.42	300.00	310.40	418.00	329.10	1,409.92
Fines.....				100.00	180.00	280.00
Legal.....	537.73	5,408.80	5,338.78	2,929.99	3,170.25	17,385.55
Patent expense.....	39.00					39.00
Miscellaneous.....	625.69	690.66	177.62	747.15	665.73	2,906.85
Directors' fees.....	95.00		20.00	50.00	165.00	330.00
Bonus on operating.....				115.00	752.49	867.49
Total general expense....	10,695.69	17,193.01	18,350.32	18,233.47	23,484.66	87,957.15
Grand total—power, operating, repair shop, and general expense.....	101,919.16	159,730.45	193,990.03	244,474.38	234,565.00	934,679.02

EXHIBIT H—Continued.

SCHEDULE 3.

Chicago Pneumatic Tube Co., Chicago, Ill.—Statement of cost of operating pneumatic tube service for United States mail for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

	1908	1909	1910	1911	1912	Total.
Power:						
Steam power purchased.....	\$9,522.62	\$10,000.00	\$13,333.33	\$11,262.42	\$8,152.90	\$52,271.27
Electric power purchased.....	12,691.17	10,601.64	8,905.32	8,691.16	10,784.60	51,673.89
Rent, light, and heat.....	1.96	12.18	8.53	11.10	11.44	45.21
Oil and waste.....	211.09	230.16	179.09	313.96	244.58	1,178.88
Engine room, labor.....	3,048.17	3,180.12	2,020.18	2,232.48	2,574.92	13,055.87
Engine and boiler room, supplies.....	112.96	109.87	99.16	50.06	73.93	445.98
Signal wires.....				90.95	91.70	182.65
Repairs—						
Power plant and piping....	349.03	315.46	116.23	435.43	1,008.58	2,224.73
Compressors and blowers....	264.54	23.35				287.89
Buildings.....		.75	95.79	89.77	43.33	229.64
Total power.....	26,201.54	24,473.53	24,757.63	23,177.33	22,985.98	121,596.01
Operating:						
Labor.....	17,249.23	16,021.57	18,811.53	20,429.90	21,573.06	94,085.29
Supplies.....	222.03	69.01	79.20	197.70	138.90	706.84
Oil and waste.....	465.52	181.22	319.42	337.44	428.71	1,732.31
Rent, light, and heat.....	80.86	30.10	77.15	35.94	117.24	341.29
Inspection.....	5,533.97	4,749.89	3,702.82	3,485.91	4,205.19	21,677.78
Mail teams.....	1,099.50	188.33	468.75	450.00	918.00	3,124.58
Traveling and miscellaneous...	679.48	833.06	637.71	335.48	455.72	2,941.45
Fines.....	5,514.39	158.43	44.40			5,717.22
Repairs—						
Tubes.....	1,478.32	213.31	347.23	301.83	170.51	2,170.18
Terminal machinery.....	458.25	208.53	1,237.67	1,207.32	3,138.19	6,249.96
Carriers.....	4,016.17	5,884.03	5,399.42	6,487.74	9,017.34	30,804.70
Buildings and fixtures.....	170.29	23.76	122.67	31.77	102.33	450.82
Extraordinary.....				3,019.57	5,156.84	8,176.41
Total operating.....	36,968.01	28,561.24	31,247.97	36,320.60	45,081.01	178,178.83
Repair shop:						
Materials, etc.....			.25			.25
Indirect labor.....	147.41	360.88	279.96	294.87	15.40	1,098.52
Expense—						
Supplies used.....	10.99		.52		5.24	16.75
Tools used.....	43.37	1.60			115.75	160.72
Rent, light, heat, and power...	270.00	150.00	150.00	262.50	48.50	881.00
Repairs—						
Buildings and fixtures.....			9.02			9.02
Machinery and tools.....	7.24	1.39				8.63
Teaming.....	1.00		13.72		30.00	44.72
Freight and express.....	24.45	3.80	5.54	.75		34.54
Miscellaneous expense.....	.95			3.79		4.74
Total repair shop.....	505.41	517.67	459.01	561.91	214.89	2,258.89
General expense:						
Salaries.....	6,163.81	5,977.82	6,280.55	6,628.70	4,508.21	29,559.09
Post printing and stationery supplies.....	147.37	118.31	130.78	142.62	109.49	648.57
Traveling.....	990.53	1,121.46	826.59	522.18	493.00	3,953.76
Telephone and telegraph.....	611.07	615.33	596.09	660.02	709.21	3,191.72
Rent, light, and heat.....	300.00	300.00	300.00	300.00	310.00	1,510.00
Legal.....	1,245.00			2,531.25	75.00	3,851.25
Fines.....				165.83	51.00	216.83
Directors' fees.....			20.00	20.00	35.00	75.00
Miscellaneous.....	498.38	583.77	337.92	479.47	356.88	2,256.42
Bonus on operating.....				40.00	234.68	274.68
Total general expense....	9,956.16	8,716.69	8,491.93	11,490.07	6,882.47	45,537.32
Grand total (power, operating, repair shop, and general expense)	73,631.12	62,269.13	64,956.54	71,549.91	75,164.35	347,571.05

EXHIBIT H—Continued.

SCHEDULE 4.

St. Louis Pneumatic Tube Co., St. Louis, Mo.—Statement of cost of operating pneumatic-tube service for United States mail for the five years ended Mar. 31, 1908, 1909, 1910, 1911, and 1912.

	1908	1909	1910	1911	1912	Total.
Power:						
Steam power purchased.....	\$3,070.00	\$3,070.00	\$2,884.31	\$4,943.19	\$4,208.15	\$18,175.65
Oil, waste, and packing.....	20.00	174.46	55.24	176.32	71.36	497.38
Engine and boiler room, labor..	1,860.91	1,902.45	1,825.00	1,825.00	1,830.00	9,243.36
Engine room, supplies.....		79.41	18.90		20.06	118.37
Repairs—						
Power plant and piping.....				29.15	361.06	390.21
Compressors.....	1.85	12.04				13.89
Total power.....	4,952.76	5,238.36	4,783.45	6,973.66	6,490.63	28,438.86
Operating:						
Labor.....	4,098.27	4,281.61	3,797.11	3,910.18	3,806.41	19,893.58
Supplies.....	46.58	26.21	43.10	104.69	89.05	309.63
Oil and waste.....	132.77	64.98	75.59	52.14	129.30	454.78
Rent, light, heat, and power...	360.00	360.00	360.00	360.00	360.00	1,800.00
Inspection.....	2,082.30	1,759.21	1,696.99	1,821.05	1,680.64	9,040.19
Mail teams.....			666.75			666.75
Traveling and miscellaneous...	311.11	343.97	359.73	178.91	209.70	1,403.42
Fines.....	30.14	83.43				113.57
Repairs—						
Tubes.....	442.51	97.06	126.39	237.57	357.87	786.26
Terminal machinery.....	200.73	7.81	63.17	49.09	18.11	302.69
Carriers.....	3,966.38	402.84	549.03	666.99	855.18	6,440.42
Buildings and fixtures.....		.43	1.80	1.70		3.93
Extraordinary.....	1,005.70	2,400.00	2,400.00	643.38	201.41	6,650.49
Total operating.....	12,676.49	9,827.55	10,139.66	7,550.56	7,671.45	47,865.71
Repair shop:						
Indirect labor.....	54.61	64.96				119.57
Expense—						
Supplies used.....	7.17	4.80	.25			12.22
Tools.....	41.50	6.31	11.00			58.81
Repairs, machinery, and tools..		.63				.63
Teaming.....	24.78	.83				25.61
Experimental work.....		26.00				26.00
Freight and express.....	9.47		.50	1.10		11.07
Total repair shop.....	137.53	103.53	11.75	1.10		253.91
General expense:						
Salaries.....	2,700.15	2,734.77	2,888.98	2,979.52	1,204.86	12,508.28
Postage and stationery.....	47.08	4.38	25.50	81.33	44.50	202.79
Traveling.....	322.43	113.95	103.05	190.45	238.85	968.73
Telephone and telegraph.....	155.30	155.00	150.23	183.58	245.55	889.66
Rent, light, and heat.....	300.00	300.00	300.00	300.00	300.00	1,500.00
Fines.....					2.00	2.00
Legal.....	2,500.00			500.00		3,000.00
Miscellaneous.....	328.60	627.48	142.33	312.25	232.87	1,643.53
Directors' fees.....					20.00	20.00
Bonus on operating.....				6.00	78.82	84.82
Total general expense....	6,353.56	3,935.58	3,610.09	4,553.13	2,367.45	20,819.81
Grand total—power, operating, repair shop, and general expense.....	24,120.34	19,105.02	18,544.95	19,078.45	16,529.53	97,378.29

EXHIBIT H—Continued.

SCHEDULE 5.

American Pneumatic Service Co., Boston, Mass.—Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the year ended Mar. 31, 1908.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$8,400.00	\$44,679.94	\$9,522.62	\$3,070.00	\$65,672.56
Electric power purchased.....	14,422.35	.....	12,691.17	.....	27,113.52
Fuel.....	1,067.90	.....	.....	.....	1,067.90
Rent, light, and heat.....	98.80	1,560.00	1.96	.....	1,660.76
Oil and waste.....	249.52	271.89	211.09	20.00	752.50
Engine and boiler room—					
Labor.....	2,130.81	7,430.52	3,048.17	1,860.91	14,470.41
Supplies.....	54.65	79.62	112.96	.....	247.23
Repairs—					
Power, plant, and piping.....	165.27	52.85	349.03	.....	567.15
Compressors and blowers.....	73.03	170.89	264.54	1.85	510.31
Total power.....	26,662.33	54,245.71	26,201.54	4,952.76	112,062.34
Operating:					
Labor.....	16,471.08	22,651.92	17,249.23	4,098.27	60,470.50
Supplies.....	202.57	213.10	222.03	46.58	684.28
Oil and waste.....	956.61	356.89	465.52	132.77	1,911.79
Rent, light, and heat.....	277.98	.....	80.86	360.00	718.84
Inspection.....	3,455.39	2,658.20	5,533.97	2,082.30	13,729.86
Mail teams.....	284.85	867.20	1,099.50	.....	2,251.55
Traveling and miscellaneous.....	2,925.91	566.47	679.48	311.11	4,482.97
Fines.....	46.64	516.45	5,514.39	30.14	6,107.62
Repairs—					
Tubes.....	361.49	2,313.12	1,478.32	442.51	4,595.44
Terminal machinery.....	731.40	575.54	458.25	200.73	1,965.92
Carriers.....	8,624.69	5,578.74	4,016.17	3,966.38	22,185.98
Buildings and fixtures.....	35.54	13.32	170.29	.....	219.15
Extraordinary.....	1,000.00	143.41	.....	1,005.70	2,149.11
Total operating.....	35,374.15	36,454.36	36,968.01	12,676.49	121,473.01
Repair shop:					
Indirect labor.....	.....	.....	147.41	54.61	202.02
Expense—					
Supplies used.....	.....	.....	10.99	7.17	18.16
Tools used.....	.....	119.52	43.37	41.50	204.39
Rent, light, heat, and power.....	.....	381.40	270.00	.....	651.40
Repairs, machinery and tools.....	.....	18.13	7.24	.....	25.37
Teaming.....	.....	.....	1.00	24.78	25.78
Freight and express.....	.....	.....	24.45	9.47	33.92
Miscellaneous expense.....	.....	.....	.95	.....	.95
Telephone and telegraph.....	.....	4.35	.....	.....	4.35
Total repair shop.....	.....	523.40	505.41	137.53	1,166.34
General expense:					
Salaries.....	4,858.72	7,505.35	6,163.81	2,700.15	21,228.03
Post printing and stationery supplies..	20.00	186.01	147.37	47.08	400.46
Traveling.....	15.81	374.97	990.53	322.43	1,703.74
Telephone and telegraph.....	443.00	1,279.52	611.07	155.30	2,488.89
Rent, light, and heat.....	300.00	52.42	300.00	300.00	952.42
Legal.....	.....	537.73	1,245.00	.....	1,782.73
Directors' fees.....	.....	95.00	.....	328.60	423.60
Miscellaneous.....	231.85	625.69	498.38	2,500.00	3,855.92
Patent expense.....	.....	39.00	.....	.....	39.00
Total general expense.....	5,869.38	10,695.69	9,956.16	6,353.56	32,874.79
Grand total—power, operating, repair shop, and general expense.....	67,905.86	101,919.16	73,631.12	24,120.34	267,576.48

EXHIBIT H—Continued.

SCHEDULE 6.

American Pneumatic Service Co., Boston, Mass.—Statement of cost of operating pneumatic tube service for United States mail of subsidiary companies for the year ended Mar. 31, 1909.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$8,400.00	\$36,853.34	\$10,000.00	\$3,070.00	\$58,323.34
Electric power purchased.....	14,284.97	31,896.99	10,601.64		56,783.60
Fuel.....	19.51				19.51
Rent, light, and heat.....	5.50	1,480.00	12.18		1,497.68
Oil and waste.....	442.39	573.35	230.16	174.46	1,420.36
Engine and boiler room labor.....	2,064.77	7,097.20	3,180.12	1,902.45	14,244.54
Engine and boiler room supplies.....	43.90	16.17	109.87	79.41	249.35
Repairs—					
Power, plant, and piping.....	76.25	69.40	315.46		461.11
Compressors and blowers.....	23.09	400.12	23.35	12.04	458.60
Building.....			.75		.75
Total power.....	25,321.36	78,386.57	24,473.53	5,238.36	133,419.82
Operating:					
Labor.....	16,235.69	40,993.23	16,021.57	4,281.61	77,532.10
Supplies.....	219.63	74.30	69.01	26.21	389.15
Oil and waste.....	217.16	438.08	181.22	64.98	901.44
Rent, light, and heat.....	183.46		30.10	360.00	573.56
Inspection.....	3,169.75	2,867.61	4,749.89	1,759.21	12,546.46
Mail team.....	117.07	1,787.85	188.33		2,093.25
Traveling and miscellaneous.....	393.67	1,041.37	833.06	343.97	2,612.07
Fines.....	12.00	134.16	158.43	83.43	388.02
Repairs—					
Tubes.....	72.74	5,788.66	213.31	97.06	6,171.77
Terminal machinery.....	185.38	345.42	208.53	7.81	747.14
Carriers.....	5,960.02	7,962.87	5,884.03	402.84	20,209.76
Building and fixtures.....		5.10	23.76	.43	29.29
Extraordinary.....	2,400.00	1,750.00		2,400.00	6,550.00
Total operating.....	29,166.57	63,188.65	28,561.24	9,827.55	130,744.01
Repair shop:					
Indirect labor.....		1.47	360.88	64.96	427.31
Expenses—					
Supplies used.....				4.80	4.80
Tools used.....		11.46	1.60	6.31	19.37
Rent, light, heat, and power.....		927.90	150.00		1,077.90
Repairs—machinery and tools.....			1.39	.63	2.02
Teaming.....				.83	.83
Freight and express.....			3.80		3.80
Miscellaneous expenses.....		16.44			16.44
Experimental work.....				26.00	26.00
Telephone and telegraph.....		4.95			4.95
Total repair shop.....		962.22	517.67	103.53	1,583.42
General expense:					
Salaries.....	5,443.93	7,376.13	5,977.82	2,734.77	21,532.65
Post printing and stationery supplies..	12.43	84.60	118.31	4.38	219.72
Traveling.....	10.80	1,309.18	1,121.46	113.95	2,555.39
Telephone and telegraph.....	551.97	2,023.64	615.33	155.00	3,345.94
Rent, light, and heat.....	300.00	300.00	300.00	300.00	1,200.00
Legal.....		5,408.80			5,408.80
Miscellaneous.....	407.00	690.66	583.77	627.48	2,308.91
Total general expense.....	6,726.13	17,193.01	8,716.69	3,935.58	36,571.41
Grand total—power, operating, repair shop, and general expense.....	61,214.06	159,730.45	62,269.13	19,105.02	302,318.66

EXHIBIT H—Continued.

SCHEDULE 7.

American Pneumatic Service Co., Boston, Mass.—Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the year ended Mar. 31, 1910.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$8,400.00	\$31,701.26	\$13,333.33	\$2,884.31	\$56,318.90
Electric power purchased.....	10,931.70	57,671.68	8,905.32	.....	77,508.70
Rent, light, and heat.....	3.60	602.50	8.53	.....	614.63
Oil and waste.....	345.46	1,163.63	179.09	55.24	1,743.42
Engine and boiler room—					
Labor.....	1,905.84	7,465.27	2,020.18	1,825.00	13,216.29
Supplies.....	23.18	58.31	99.16	18.90	199.55
Repairs—					
Power plant and piping.....	610.73	369.71	116.23	.....	1,096.67
Buildings.....	.....	.....	95.79	.....	95.79
Total power.....	22,220.51	99,032.36	24,757.63	4,783.45	150,793.95
Operating:					
Labor.....	15,988.03	54,419.34	18,811.53	3,797.11	93,016.01
Supplies.....	122.47	156.82	79.20	43.10	401.59
Oil and waste.....	193.16	552.83	319.42	75.59	1,141.00
Rent, light, and heat.....	30.20	16.70	77.15	360.00	484.05
Inspection.....	2,696.61	3,725.98	3,702.82	1,696.99	11,822.40
Automobile expense.....	.....	91.35	.....	.....	91.35
Mail teams.....	138.10	.....	468.75	666.75	1,273.60
Traveling and miscellaneous.....	261.96	1,179.31	637.71	359.73	2,438.71
Fines.....	1.00	60.00	44.40	.....	105.40
Repairs—					
Tubes.....	58.91	388.01	347.23	126.39	920.54
Terminal machinery.....	408.26	1,338.34	1,237.67	63.17	3,047.44
Carriers.....	4,803.00	12,447.33	5,399.42	549.03	23,198.78
Buildings and fixtures.....	77.18	5.36	122.67	1.80	207.01
Extraordinary.....	2,400.00	2,100.00	.....	2,400.00	6,900.00
Total operating.....	27,178.88	76,481.37	31,247.97	10,139.66	145,047.88
Repair shop:					
Materials, etc.....	.....	.....	.25	.....	.25
Indirect labor.....	.....	91.27	279.96	.....	371.23
Expense—					
Supplies used.....	.....	.....	.52	.25	.77
Tools used.....	.....	24.31	.....	11.00	35.31
Rent, light, heat, and power.....	.....	.....	150.00	.....	150.00
Repairs—					
Buildings and fixtures.....	.....	.....	9.02	.....	9.02
Machinery and tools.....	.....	8.00	.....	.....	8.00
Teaming.....	.....	.....	13.72	.....	13.72
Freight and express.....	.....	.....	5.54	.50	6.04
Experimental work.....	.....	2.40	.....	.....	2.40
Total repair shop.....	.....	125.98	459.01	11.75	596.74
General expense:					
Salaries.....	5,688.53	9,147.11	6,280.55	2,888.98	24,005.17
Postage, printing, and stationery supplies.....	44.12	51.20	130.78	25.50	251.60
Traveling.....	18.40	527.20	826.59	103.05	1,475.24
Telephone and telegraph.....	439.10	2,778.01	596.09	150.23	3,963.43
Rent, light, and heat.....	300.00	310.40	300.00	300.00	1,210.40
Legal.....	.....	5,338.78	.....	.....	5,338.78
Directors' fees.....	.....	20.00	20.00	.....	40.00
Miscellaneous.....	20.45	177.62	337.92	142.33	678.32
Total general expense.....	6,510.60	18,350.32	8,491.93	3,610.09	36,962.94
Grand total—Power, operating, repair shop, and general expense.....	55,909.99	193,990.03	64,956.54	18,544.95	333,401.51

EXHIBIT H—Continued.

SCHEDULE 8.

American Pneumatic Service Co., Boston, Mass.—Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the year ended March 31, 1911.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$7,283.30	\$35,337.23	\$11,262.42	\$4,943.19	\$58,826.14
Electric power purchased.....	9,662.74	61,527.11	8,691.16		79,881.01
Rent, light, and heat.....		582.14	11.10		593.24
Oil and waste.....	432.75	1,177.36	313.96	176.32	2,100.39
Engine and boiler room labor.....	1,955.97	7,118.65	2,232.48	1,825.00	13,132.10
Engine and boiler room supplies.....	19.88	81.67	50.06		151.61
Signal wires.....	138.96	563.26	90.95		793.17
Repairs—					
Power plant and piping.....	407.13	661.67	435.43	29.15	1,533.38
Compressors and blowers.....		.52			.52
Buildings.....			89.77		89.77
Total power.....	19,900.73	107,049.61	23,177.33	6,973.66	157,101.33
Operating:					
Labor.....	15,597.71	57,915.45	20,429.90	3,910.18	97,853.24
Supplies.....	112.17	181.20	197.70	104.69	595.76
Oil and waste.....	179.63	471.89	337.44	52.14	1,041.10
Rent, light, and heat.....		22.30	35.94	360.00	418.24
Inspection.....	2,659.09	4,214.29	3,485.91	1,821.05	12,180.34
Mail teams.....	113.97	151.25	450.00	237.57	715.22
Traveling and miscellaneous.....	209.41	1,213.63	335.48	178.91	1,937.43
Repairs—					
Tubes.....	275.86	991.56	301.83		1,331.68
Terminal machinery.....	460.82	1,662.80	1,207.32	49.09	3,380.03
Carriers.....	3,408.28	12,055.00	6,487.74	666.99	22,618.01
Buildings and fixtures.....	3.75	66.43	31.77	1.70	103.65
Extraordinary.....	2,632.06	40,179.45	3,019.57	643.38	46,474.46
Total operating.....	25,652.75	119,125.25	36,320.60	7,550.56	188,649.16
Repair shop:					
Indirect labor.....			294.87		294.87
Expense, tools used.....		63.30			63.30
Rent, light, heat, and power.....			262.50		262.50
Teaming.....		2.75			2.75
Freight and express.....			.75	1.10	1.85
Miscellaneous expense.....			3.79		3.79
Total repair shop.....		66.05	561.91	1.10	629.06
General expense:					
Salaries.....	5,798.68	9,579.94	6,628.70	2,979.52	24,986.84
Post, printing and stationery supplies.....	58.12	136.97	142.62	81.33	419.04
Traveling.....	12.60	934.77	522.18	190.45	1,660.00
Telephone and telegraph.....	531.38	3,221.65	660.02	183.58	4,596.63
Rent, light, and heat.....	300.00	418.00	300.00	300.00	1,318.00
Legal.....		2,929.99	2,531.25	500.00	5,961.24
Fines.....	6.00	100.00	163.83		271.83
Directors' fees.....		50.00	20.00		70.00
Miscellaneous.....	126.04	747.15	479.47	312.25	1,664.91
Bonus on operating.....	44.00	115.00	40.00	6.00	205.00
Total general expense.....	6,876.82	18,233.47	11,490.07	4,553.13	41,153.49
Grand total—power, operating, repair shop, and general expense.....	52,430.30	244,474.33	71,549.91	19,073.45	387,533.04

EXHIBIT H—Continued.

SCHEDULE 9.

American Pneumatic Service Co., Boston, Mass.—Statement of cost of operating pneumatic-tube service for United States mail of subsidiary companies for the year ended March 31, 1912.

	Boston.	New York.	Chicago.	St. Louis.	Total.
Power:					
Steam power purchased.....	\$5,719.71	\$27,863.90	\$8,152.90	\$4,208.15	\$45,944.66
Electric power purchased.....	9,032.36	68,349.30	10,784.60	.....	88,166.26
Rent, light, and heat.....	.....	600.00	11.44	.....	611.44
Oil and waste.....	302.01	1,480.30	244.58	71.36	2,098.25
Engine and boiler room—					
Labor.....	1,990.76	7,367.45	2,574.92	1,830.00	13,763.13
Supplies.....	22.02	81.92	73.93	20.06	197.93
Signal wires.....	154.16	709.50	91.70	.....	955.36
Repairs—					
Power, plant, and piping.....	51.27	1,520.99	1,008.58	361.06	2,941.90
Buildings.....	.....	.....	43.33	.....	43.33
Total power.....	17,272.29	107,973.36	22,985.98	6,490.63	154,722.26
Operating:					
Labor.....	14,872.66	65,344.40	21,573.06	3,806.41	105,596.53
Supplies.....	108.99	81.84	138.90	89.05	418.78
Oil and waste.....	233.82	376.76	428.71	129.30	1,168.59
Rent, light, and heat.....	.....	7.20	117.24	360.00	484.44
Inspection.....	2,840.54	4,836.19	4,205.19	1,680.64	13,562.56
Automobile expense.....	219.32	.....	.....	.....	219.32
Mail teams.....	124.92	124.00	918.00	.....	1,166.92
Traveling and miscellaneous.....	170.65	1,276.76	455.72	209.70	2,112.83
Repairs—					
Tubes.....	546.66	1,558.57	170.51	357.87	2,292.59
Terminal machinery.....	248.01	3,165.97	3,138.19	18.11	6,534.06
Carriers.....	4,761.40	23,121.90	9,017.34	855.18	37,755.82
Buildings and fixtures.....	3.93	30.44	102.33	.....	136.70
Extraordinary.....	736.85	2,999.16	5,156.84	201.41	9,094.26
Total operating.....	24,867.75	102,923.19	45,081.01	7,671.45	180,543.40
Repair shop:					
Indirect labor.....	.....	.....	15.40	.....	15.40
Expense—					
Supplies used.....	.....	23.92	5.24	.....	29.16
Tools used.....	.....	130.66	115.75	.....	246.41
Rent, light, heat, and power.....	.....	.....	48.50	.....	48.50
Repairs, buildings and fixtures.....	.....	9.17	.....	.....	9.17
Teaming.....	.....	19.75	30.00	.....	49.75
Freight and express.....	.....	.29	.....	.....	.29
Total repair shop.....	.....	183.79	214.89	.....	398.68
General expense:					
Salaries.....	2,926.58	13,594.00	4,508.21	1,204.86	22,233.65
Post office printing and stationery supplies.....	3.45	142.39	109.49	44.50	299.83
Traveling.....	.....	745.50	493.00	238.85	1,477.35
Telephone and telegraph.....	534.38	3,740.20	709.21	245.55	5,229.34
Rent, light, and heat.....	300.00	329.10	310.00	300.00	1,239.10
Legal.....	.....	3,170.25	75.00	.....	3,245.25
Fines.....	2.00	180.00	51.00	2.00	235.00
Directors' fees.....	75.00	165.00	35.00	20.00	295.00
Miscellaneous.....	40.16	665.73	356.88	232.87	1,295.64
Bonus on operating.....	269.03	752.49	234.68	78.82	1,335.02
Total general expense.....	4,150.60	23,484.66	6,882.47	2,367.45	36,885.18
Grand total—power, operating, repair shop, and general expense.....	46,290.64	234,565.00	75,164.35	16,529.53	372,549.52

EXHIBIT I.

American Pneumatic Service Co.—Summary of construction charges to Dec. 31, 1912.

	Boston (Exhibit J).	New York and Brooklyn (Exhibit K).	Chicago (Exhibit L).	St. Louis (Exhibit M).	Total.
Direct construction items.....	\$399,585.80	\$2,497,182.61	\$506,504.33	\$107,356.95	\$3,510,629.69
Legal expenses.....			31,215.89	12,800.00	44,015.89
Interest.....		90,684.86	32,998.20	13,500.00	137,183.06
Discount and expense account, sale of securities.....			59,470.34	15,832.16	75,302.50
Royalties.....		410,743.18			410,743.18
Patent rights.....		134,000.00			134,000.00
Unidentified expenses.....		33,773.30			33,773.30
Stock of Chicago Pneumatic Service Co., account franchise.....			275,000.00		275,000.00
Organization expense.....		63,264.35			63,264.35
Excess, account Ryan contract (see Exhibit K for details).....		15,000.00			15,000.00
	399,585.80	3,244,648.30	905,188.76	149,489.11	4,698,911.97
Profit or loss on contracts made by American Pneumatic Service Co....	45,524.54		57,078.79	37,205.64	25,651.39
Total cost, as per ledgers.....	445,110.34	3,244,648.30	848,109.97	186,694.75	4,724,563.36

NOTE.—Direct construction items charged New York and Brooklyn in this statement include the Ryan contract for \$590,000, of which \$100,000 was paid in stock, and the Belden contract for \$400,000, one-half of which was paid in stock and one-half in bonds.
See text of report for items charged plant and franchise on books of Tubular Dispatch Co., and the New York Pneumatic Service Co., which have been omitted by us in making up figures showing cost of New York and Brooklyn tubes.

EXHIBIT J.

American Pneumatic Service Co. construction charges to Dec. 31, 1912, for Boston tubes.

Original construction:		
Freight and express.....	\$1,136.38	
Miscellaneous construction.....	55,788.85	
Ten per cent on construction to Batcheller Construction Co.....	4,049.66	
Sundry general expense.....	1,458.35	
Engineers' salaries and expenses.....	7,234.38	
		\$69,667.62
Transferred to the following construction ac- counts:		
North Station line.....	63,001.19	
Ten-inch line.....	6,615.01	
Associated Press line.....	51.42	
		69,667.62
North Station line:		
Amount transferred from original construction	63,001.19	
Charges for material, labor, etc.....	5,197.22	
Total ledger cost.....		\$68,198.41
Ten-inch line:		
Amount transferred from original construction	6,615.01	
Miscellaneous construction.....	230,945.45	
Engineers' salaries and expenses.....	646.55	
	238,207.01	
Relocation of stations.....	7,339.10	
		245,546.11
Profit on contract.....		22,314.51
Total ledger cost.....		267,860.62

South Station line:

Labor.....	\$1, 617. 60	
Miscellaneous construction.....	62, 734. 51	
		<u>\$64, 352. 11</u>
Profit on contract.....		19, 855. 43

Total ledger cost..... \$84, 207. 54

Power control:

Cost of power-saving device.....	2, 111. 49	
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Total ledger cost of United States mail tube lines and power control. 422, 408. 06

Small tube lines:

Associated Press—

Amount transferred from original construction.....	\$51. 42	
Additional charges.....	15, 250. 43	

15, 301. 85

Profit on contract..... 3, 354. 60

\$18, 656. 45

Financial Press Association—Material, labor, etc..... 1, 845. 83

Postal Telegraph—Material, labor, etc..... 2, 200. 00

22, 702. 28

Total ledger cost of United States mail and small tube lines..... 445, 110. 34

EXHIBIT K.

American Pneumatic Service Co. construction charges to Dec. 31, 1912, for New York and Brooklyn tubes.

Original construction:

Contract with C. J. Ryan & Co., as shown by books of Tubular Dispatch Co. (\$100,000 of which was paid for in capital stock of latter company).....		\$590, 000. 00	
Taxes, account Brooklyn Bridge.....		916. 66	
Bond premium for street opening and petty charges.....		406. 26	
Belden & Co. contract, payable one-half in capital stock and one-half in bonds of the N. Y. M. & N. T. Co.....		400, 000. 00	
Organization expense (\$5,000 paid in capital stock).....	\$7, 264. 35		
Interest on bonds, July 1 to Aug. 1, 1898.....	833. 33		
Disbursements and service rendered (paid in capital stock).....	56, 000. 00		
Cost of property, franchises, patent rights, and construction, against which was issued 6,050 shares capital stock of N. Y. M. & N. T. Co.....	\$605, 000. 00		
Less taken to account above as Ryan contract.....	590, 000. 00		
		<u>15, 000. 00</u>	
Patent rights assigned by W. A. H. Bogardus, Aug. 4, 1902, for treasury stock.....	134, 000. 00		
		<u>213, 097. 68</u>	

Total cost per ledger of N. Y. M. & N. T. Co..... 1, 204, 420. 60

New construction:

Engineers' and draftmen's salaries and expenses.....	\$86, 878. 07	
Inspectors' salaries.....	40, 219. 77	
Pipe, fittings, etc.....	400, 546. 46	
Trenching and pipe laying.....	638, 460. 47	
Miscellaneous.....	29, 414. 67	
Extraordinary expenses, moving stations.....	21, 193. 26	

New construction—Continued.

Extraordinary repairs.....	\$20, 157. 77
Terminal machinery.....	289, 725. 24
Insurance during construction.....	12, 611. 24

1, 539, 206. 95

Deduct :

Material charged above, not
used.....\$26, 138. 70

Transfer to franchise ac-
count for material and la-
bor used to rehabilitate
lines of New York Pneu-
matic Service Co. prior to
Sept. 30, 1907..... 70, 000. 00

96, 138. 70

1, 443, 068. 25

New carriers..... 48, 707. 04

\$1, 491, 775. 29

Interest..... 89, 851. 53

Sundry expense to Mar. 31, 1911, for
which no information can be ob-
tained..... 33, 773. 30

Royalty—

To Mar. 31, 1911.....\$405, 310. 79

To Jan. 31, 1912..... 5, 432. 39

410, 743. 18

534, 368. 01

Total cost per ledger of N. Y. M. & N. T. Co.....\$2, 026, 143. 30

New construction (Madison Square, Wall Street and "P"
lines):

Sundry material and labor..... 10, 763. 48

New carriers..... 3, 071. 50

Sundry equipment..... 249. 42

Total per ledger N. Y. M. & N. T. Co..... 3, 244, 648. 30

EXHIBIT L.

American Pneumatic Service Co. construction charges to Dec. 31, 1912, for Chicago tubes.

Original construction:

Pay roll (sundry labor)..... \$25, 398. 71

Freight and express..... 437. 69

General expense..... 3, 689. 66

Miscellaneous construction..... 367, 006. 11

Sundry cash expenses..... 2, 007. 05

Engineers—Salaries and expenses..... 6, 549. 40

Chicago repairs and transfer from operating. 2, 456. 93

Operating expenses charged on account of
delays..... 5, 736. 69

413, 282. 24

New carriers..... 13, 420. 00

\$426, 702. 24

Legal expenses paid—

Nathan Frank..... \$2, 000. 00

A. A. Goodrich..... 29, 215. 89

31, 215. 89

Interest—Oct. 12, 1903, to June 30, 1904, on
\$767,400 at 6 per cent..... 32, 998. 20

Proportion of discount and expenses
charged, account of sale of bonds of Ameri-
can Pneumatic Service Co..... 59, 470. 34

Original construction—Continued.

Stock of Chicago Pneumatic Service Co. held as an investment by American Pneumatic Service Co. given account of franchise.....	\$275,000.00	
	398,684.43	
Less loss on contract.....	57,078.79	\$341,605.64
Total ledger cost of original construction.....		\$768,307.88
Northwestern station:		
Charges for material, labor, etc.....	24,173.91	
Charges for new carriers.....	1,348.05	
Total ledger cost.....		25,521.96
Station U to Northwestern Station: Charges for material, labor, etc.....	17,315.63	
Total ledger cost.....		17,315.63
Station U: Charges for material, labor, etc.....	5,524.38	
Total ledger cost.....		5,524.38
Fifth Avenue tunnel:		
Charges for material, labor, etc.....	\$28,813.55	
Charges for carriers.....	2,000.00	
	30,813.55	
Total ledger cost.....		30,813.55
Power control: Cost of power-saving device.....	626.57	
		626.57
Grand total ledger cost.....		848,109.97

EXHIBIT M.

American Pneumatic Service Co., construction charges to Dec. 31, 1912, for St. Louis tubes.

Pay roll (sundry labor).....	\$3,679.47	
Freight and express.....	160.25	
General expense.....	631.79	
Miscellaneous construction.....	91,354.20	
Sundry cash expense.....	2,348.13	
Rent: Terminal.....	180.00	
Extraordinary repairs.....	1,000.00	
	99,353.84	
New carriers.....	3,000.00	\$102,353.84
Legal expenses paid Nathan Frank.....	12,800.00	
Interest, Oct. 1, 1903, to June 30, 1904, on \$300,000 at 6 per cent.....	13,500.00	
Proportion of discount and expenses charged account of sale of bonds of American Pneumatic Service Co.....	15,832.16	
Profit originally charged to construction.....	\$156,514.00	
Less transferred to reserve for completion.....	119,308.36	
	37,205.64	
		79,337.80
Total cost per their books of 8-inch line.....		181,691.64
Charges for material, labor, etc., for new post-office extension.....		5,003.11
Total ledger cost.....		186,694.75

EXHIBIT N.

Tubular Dispatch Co., property franchises, patents, and construction account.

Patent rights and services rendered (issue of capital stock)	\$1,299,500.00	
Discount on 600 bonds (par \$1,000), sold at \$732.....	160,800.00	
Commission on 600 bonds sold.....	40,000.00	
Interest on outstanding bonds prior to operating.....	2,040.54	
Cash paid for permits opening streets.....	169.37	
Disbursements to Dec. 31, 1897, incident to organization:		
General expenses.....	\$21,622.51	
Legal expenses (includes disbursements to Oct. 31, 1898).....	15,666.66	
Salary account.....	2,399.99	
Drawing materials.....	25.06	
Traveling expenses.....	539.45	
		40,253.67
Central Trust Co. (for receiving funds on account convertible first-mortgage bonds and disbursing same, \$545,459.25, at $\frac{1}{8}$ per cent).....		681.82
C. J. Ryan & Co. (per settlement of contract and completion of same).....		590,000.00
C. J. Ryan & Co. (amounts charged to C. J. Ryan & Co., and which were not all owed in settlement).....		8,636.03
W. A. H. Bogardus: License to use patent rights.....		1,600.00
		<hr/> 2,143,681.43

REPORT OF

ALFRED BROOKS FRY

CONSULTING ENGINEER TO THE COMMISSION TO INVESTIGATE THE
PNEUMATIC-TUBE POSTAL SYSTEM, ON THE ENGINEERING AND
ALLIED FEATURES CONNECTED WITH THE FEASIBILITY
AND DESIRABILITY OF THE GOVERNMENT'S PUR-
CHASE AND OPERATION OF THE PRESENT
POSTAL PNEUMATIC-TUBE SERVICE IN
CITIES WHERE NOW INSTALLED

FOREWORD.

NEW YORK, *March 10, 1913.*

This report gives—

Descriptions and inventories of the plants and equipment of the postal pneumatic tube companies in Boston, New York, Brooklyn, Philadelphia, Chicago, and St. Louis.

Statements in detail of the physical condition of said plants and their equipment at the present time.

Reported construction costs of said plants and their equipment.

Estimates of costs of reproducing same.

Tentative estimates of the probable “value” to the Government of said postal tube systems.

Reported costs of operation of said systems.

Estimates of Government costs of operation of the same.

Miscellaneous data regarding said plants, including detailed statements of stoppages and derangements during the past year; notes on street work or other municipal conditions that would affect typical new tube construction, notably in New York; notes on the system owned and operated by the United States Treasury Department between the United States customhouse and United States appraisers' warehouse, New York; certain briefs on related subjects, submitted to the consulting engineer by the representatives of the tube companies; reports of the engineers employed in the cities heretofore named in this investigation, etc.

This foreword is followed by a table which gives the principal data concerning the tube companies in the cities heretofore named. It is a résumé of body of report.

A. B. F.

REPORT OF ALFRED BROOKS FRY.

NEW YORK, *March 10, 1913.*

The CHAIRMAN PNEUMATIC TUBE COMMISSION,
Senate Office Building, Washington, D. C.

SIR: Referring to your letter of February 4, 1913, and to my letter of January 29, I beg to transmit herewith the following report on the engineering and allied features connected with the feasibility and desirability of the Government's purchase and operation of the present postal pneumatic tube service in cities where now installed.

I am taking up the matters concerning systems in said cities in the order of postal pneumatic tube mileage, considering, for obvious practical reasons, the inclusion of the tube system of Brooklyn in that of New York.

NEW YORK AND BROOKLYN PNEUMATIC TUBE SYSTEM.

Owner: The New York Pneumatic Service Co.

FIRST. PHYSICAL DESCRIPTION.

Installations made from 1897 to date.

Routes shown by inclosed map marked "Exhibit A, map showing pneumatic mail tube lines in New York, N. Y., and projected extensions thereto. May 1, 1910. Revised August 23, 1910, January 1, 1911, June 27, 1912."

Length of tubing in use (including Brooklyn), 54.2830 miles.

NOTE.—On this date the Government is paying the company for 27.1189 double miles (25.7689 miles in New York and 1.35 miles in Brooklyn), or 54.2378 double miles. The difference between "paid" and "used" mileage is as follows:

(1) 0.0121 mile added in alterations in Chambers and Pearl Streets, for which an official order has not been given.

(2) 0.0092 mile in the Brooklyn Station L line, payment on which is limited by contract to a maximum of 1.35 miles, while actual distance is 1.3592 miles.

(3) Increase in line at Station V due to moving machinery 0.0008 mile, total 0.0221 mile.

Street vaults.....	112
Standpipes.....	58
Sets of bends.....	1,945
Closures.....	1,335
Number of carriers, 1,500 per set, total.....	3,000

NOTE.—The official mileage until October 8, 1912 (including Brooklyn), was 26.5230. On that date an official order was issued which increased the official mileage to 27.1189 miles, as stated above. Note also that the statement of service, mileage, etc., as given in

previous reports, covers to the end of the company's last fiscal year, i. e., March 31, 1912.

Reference is had to Exhibit B, New York Pneumatic Service Co., List of Equipment, February 5, 1913, from which the following is summarized:

STATION AND POWER EQUIPMENT.

Brooklyn, Station L.:

Terminals—

- 1 sluice-gate closed receiver, No. 7.
- 1 gravity transmitter, No. 6.

Brooklyn, general post office:

Terminals—

- 2 sluice-gate open receivers, Nos. 3, 5.
- 1 gravity transmitter, No. 4.
- 1 cradle transmitter, No. 2.

Power plant—

- 2 75-horsepower Rand drill duplex steam compressors, Nos. 112-3, 114-5.
- 1 Laidlaw-Dunn-Gordon duplex steam compressor, No. 116-7.
- 2 gauge boards.
- 1 air receiver.

New York, general post office:

Terminals—

- 5 sluice-gate open receivers, Nos. 13, 15, 17, 19, 21.
- 3 cradle transmitters, Nos. 12, 14, 16.
- 2 gravity transmitters, Nos. 18, 20.

Power plant—

- 2 75-horsepower Rand drill duplex steam compressors, Nos. 101-102, 107-108.
- 1 100-horsepower Ingersoll duplex steam compressor, Nos. 105-106.
- 3 sets direct-connected Connorsville motor blowers, Nos. 109, 110.
- 1 direct-connected Laidlaw duplex motor compressor, No. 111.
- 4 panel boards.
- 4 air receivers.
- 1 Sprague 6 H. P. exhaust vent fan.

Station P:

Terminals—

- 1 sluice-gate closed receiver, No. 9.
- 1 gravity transmitter, No. 8.

Wall Street Station:

Terminals—1 wheel machine, i. e., selective combination receiver and transmitter, No. 1.

Hudson Terminal Station:

Terminals—

- 1 sluice-gate closed receiver, No. 11.
- 1 gravity transmitter, No. 420.

Station V:

Terminals—

- 1 revolving-valve closed receiver, No. 94.
- 1 gravity transmitter, No. 92.

Station A:

Terminals—

- 2 revolving-valve closed receivers, Nos. 89, 91.
- 2 gravity transmitters, Nos. 88, 90.
- 3 standard panel boards.

Station O:

Terminals—

- 3 revolving-valve open receivers, Nos. 81, 83, 85.
- 3 gravity transmitters, Nos. 80, 82, 84.
- 1 motor time lock, No. 321.

Power plant—

- 3 direct-connected Connorsville motor blowers, Nos. 124, 125, 126.
- 1 direct-connected Laidlaw duplex motor compressor No. 127.
- 1 combination automatic remote control panel board.
- 3 air receivers.

Station C:

Terminals—

- 1 sluice-gate closed receiver, No. 87.
- 1 gravity transmitter, No. 86.

Station E:

Terminals—

- 2 sluice-gate closed receivers, Nos. 77, 79.
- 2 gravity transmitters, Nos. 76, 78.
- 1 motor time lock.

Times Square station:

Terminals—

- 3 sluice-gate open receivers, Nos. 71, 73, 75.
- 3 gravity transmitters, Nos. 70, 72, 74.
- 2 motor time locks, No. 317.

Power Plant—

- 2 direct-connected Connorsville motor blowers, Nos. 139, 140.
- 2 direct-connected Laidlaw duplex motor compressors, Nos. 141, 142.
- 3 standard panel boards.
- 1 combination automatic remote control panel board.
- 2 air receivers.

Station G:

Terminals—

- 2 sluice-gate closed receivers, Nos. 67, 69.
- 2 gravity transmitters, Nos. 66, 68.

Station N:

Terminals—

- 1 sluice-gate closed receiver, No. 65.
- 1 gravity transmitter, No. 64.

Station W:

Terminals—

- 2 sluice-gate open receivers, Nos. 61, 63.
- 2 gravity transmitters, Nos. 60, 62.

Power plant:

- 1 direct-connected Connorsville motor blower, No. 129.
- 2 direct-connected Laidlaw duplex compressors, Nos. 128, 130.
- 3 panel boards.
- 1 air receiver.

Station H:

Terminals—

- 2 sluice-gate closed receivers, Nos. 57, 59.
- 2 gravity transmitters, Nos. 56, 58.

Station I:

Terminals—

- 2 revolving valve closed receivers, Nos. 95, 97.
- 2 gravity transmitters, Nos. 94, 96.

Station J:

Terminals—

- 2 sluice-gate open receivers, Nos. 53 and 55.
- 2 gravity transmitters, Nos. 52 and 54.
- 1 motor time lock.

Power plant—

- 2 direct-connected Connorsville motor blowers, Nos. 131 and 132.
- 1 direct-connected Laidlaw duplex motor compressor, No. 133.
- 2 standard panel boards.
- 1 combination automatic remote control panel board.
- 2 air receivers.

Station L:

Terminals—

- 1 sluice-gate open receiver, No. 49.
- 1 sluice-gate closed receiver, No. 51.
- 2 gravity transmitters, Nos. 48 and 50.

Power plant—

- 2 direct-connected Connorsville motor blowers, Nos. 134 and 135.
- 2 combination automatic remote control panel boards.
- 1 auxiliary motor compressor set, No. 148.
- 2 air receivers.
- 1 auxiliary air receiver.

Station U:

Terminals—

- 2 sluice-gate closed receivers, Nos. 45 and 47.
- 2 gravity transmitters, Nos. 44 and 46.

Station K:

Terminals—

- 2 sluice-gate open receivers, Nos. 41 and 43.
- 2 gravity transmitters, Nos. 40 and 42.

Power plant—

- 2 direct-connected Connorsville motor blowers, Nos. 136 and 137.
- 1 direct-connected Rand duplex motor compressor, No. 138.
- 1 standard panel board.
- 2 combination automatic remote control panel boards.
- 2 air receivers.
- 1 auxiliary motor-compressor set, No. 147.
- 1 auxiliary tank.
- 1 36-inch 2-horsepower exhaust fan.

Station Y:

Terminals—

- 2 sluice-gate closed receivers, Nos. 37 and 39.
- 2 gravity transmitters, Nos. 36 and 38.

Grand Central Station:

Terminals—

- 3 sluice-gate open receivers, Nos. 31, 33, 35.
- 3 gravity transmitters, Nos. 30, 32, 34.
- 1 motor time lock.

Power plant—

- 3 direct-connected Connorsville motor blowers, Nos. 143, 144, 145.
- 1 direct-connected Laidlaw motor compressor.
- 2 standard panel boards.
- 2 combination automatic remote control panel boards.
- 2 air receivers.
- 1 carrier lift.

Station F:

Terminals—

- 1 revolving-valve closed receiver.
- 1 gravity transmitter.

Madison Square Station:

Terminals—

- 2 revolving-valve open receivers, Nos. 25, 27.
- 2 gravity transmitters, Nos. 24, 26.
- 1 motor time lock, No. 312.

Power plant—

- 2 Philadelphia Corliss duplex compressors, Nos. 118-9, 120-1.
- 1 Rand duplex compressor, No. 122-3.
- 2 air receivers.

Station D:

Terminals—

- 1 revolving-valve closed receiver, No. 23.
- 1 gravity transmitter, No. 22.

NOTE.—Necessary air piping, steam piping, auxiliary piping, electric wiring, tools, lockers, accessories, etc., go with each station.

SHOP AND STREET EQUIPMENT.

[As per inventory marked "Exhibit B, N. Y. & B. No. 1."]

Said inventory comprises a property list, with a statement as to the condition of the articles enumerated and, where practicable, a statement of the age and cost, so far as same can be determined. It is proper here to remark that, subject to the notations in said inventory, the general going condition of the plant and apparatus is very good. This is illustrated by report hereto attached marked "Exhibit C, N. Y. & B. No. 2," compiled by the postmaster's office, New York, of

pneumatic-tube stoppages during the calendar year, 1912. Said report gives the date of all stoppages, the stations affected, the duration of said stoppages, and the cause thereof.

To the report of the postmaster, New York, is attached a letter dated February 14, 1913, marked "Exhibit C, N. Y. & B. No. 3," from the postmaster, Brooklyn, which states that the stoppages in the Brooklyn portion of the New York system average but about two a year and are of short duration.

Hereinafter comment is made on the matter of stoppages in the various systems, but it is here recorded that there were but four stoppages per mile of tube per year in the New York and Brooklyn postal lines during the year 1912, obviously thus showing good mechanical condition and intelligent operation.

Particular consideration has been given the matter of the probable condition of the underground tubes themselves, notably with reference to those lines that were installed in 1897 and 1898; but frankly it must be conceded that any present general physical examination of the underground tube lines in New York or the other large cities would be impracticable because of the time required, derangement to the postal service, and obvious expense.

For the most part it would mean digging trenches, similar to those required for new construction work, in busy streets passing through the heart of our largest cities. And there would be no absolute guaranty that because 100 feet of any given line was found perfectly sound the next 100 feet would be in the same condition.

We can be guided in part in our conclusions as to the condition of these underground tubes by the appearance of such samples as it has been practicable to remove and inspect. Municipal and other records should show any excavation that has been performed since tubes were laid for the purpose of installing new piping, conduits, subsequent structures, etc., near said post-office tubes, and said records have been consulted. The records of the post office show what troubles have been due to stoppages and the cause and duration of same; and, finally, the light of experience and common sense aids in determining tube condition. For example, if one were buying a going waterworks plant and found on investigation that water takers make no complaints of insufficient quantities; that there appeared to be no known derangements from leakage; and that there was a reasonably close agreement between the water pumped and the estimated or recorded water used, one could fairly assume that the underground-service system of such a water company was tight and in good condition, especially if age and character of construction were known; and as concerns the pneumatic mail tubes these data we have.

It seems that having used the sources of information available, we must largely assume the condition of the said tubes, and in New York City we may fairly believe said condition to be good.

Given freedom from electrolytic action, chemical attack, or mechanical injury, we know that cast-iron pipe, with the original "skin" unbroken on the outside, and properly coated, lasts many years. Owing to the presence of more or less moisture, quantities of vaseline and grease used for lubrication, and the fact that the bearing is on the packing rings of the pneumatic carriers, the normal internal wear in the tubes is not great. Where we have examined the New York tubes, wear has been slight.

It is, of course, true that where many mains have been laid in soil saturated with salt water, or been exposed to the possibility of settlement, electrolysis, or even undue internal wear, consideration should be given to attendant circumstances. But beyond what I have outlined for tube inspection, I do not feel that we can profitably go, even if a large sum of money and an indefinite period of time were at our disposal.

There is transmitted herewith a detailed description, marked "Exhibit D, N. Y. & B. No. 4," of an examination made of the tube sections and bends which were removed from Washington Street, Brooklyn, and South William Street, New York, on Sunday, February 16, 1913, previous arrangements having been made and excavations performed.

The sections removed in Brooklyn were from a location where some electrolytic action on the tubes might be anticipated to have existed, and some evidence thereof was found. It will be noted this electrolytic action was confined to one length. The loss from external rusting was found not material; from internal wear, noticeable rather than measurable. The deepest pit due to electrolytic action was drilled and found to have a depth of 0.16 inch below the original pipe surface.

The solid metal between bottom of pit and interior bore of pipe measured 0.415 inch, which leaves ample metal for continued use of this section of pipe for, say, 15 years. These tubes were installed in 1898.

The tube sections removed from the South William Street (Station P) line, the oldest in New York, were installed in 1898. The detailed description of condition is found in the inclosure referred to. It may be summed up by stating that the internal wear was observable rather than measurable, and that the loss of the cast iron by external corrosion is very slight. The cast-iron bends that were removed for examination were installed in 1907. They show very slight external corrosion and maximum internal wear of not over one thirty-second inch.

A special report marked "Exhibit E, N. Y. & B. No. 5," on the general going condition of the system in New York, from one of my associates, Mr. David F. Atkins, inspector of mechanical equipment, Office of Supervising Architect, Treasury Department, member American Society of Mechanical Engineers, member American Institute of Electrical Engineers, is inclosed herewith. My own observations and knowledge of the New York system confirm Mr. Atkins's report.

SECOND. PROBABLE COST OF CONSTRUCTION.

This is a matter which, particularly in New York, is exceedingly difficult to determine. It is only within, say, the past five years that standard types of apparatus have been adopted.

Undoubtedly large sums of money have been expended in experiments that were included and charged to early construction. This applies to such features as tubes, bends, transmitters, receivers, compressors, carriers, time locks, and numerous minor details. Many forms of carriers, of terminal and receiving apparatus, have been made and tested, and many types of tube fittings more or less experimental, and finally found unsuitable, have been sold as junk.

The securing of franchises and the carrying on of street work in a city like New York involve many expenses that probably do not directly appear as items in the books of the building or holding company. The following extract from the brief on behalf of the relators-respondents in the well-known case of the People of the State of New York on the relation of Third Avenue Railroad Co. against the Public Service Commission for the First District of New York, might well apply to a great deal of the pneumatic-tube construction in New York and other cities:

The electrification of the Third Avenue system must have been extremely difficult and costly. The work involved was difficult subsurface construction on the most congested avenue in the city, if not in the whole country, and on one of the busiest of thoroughfares. There existed an elevated railroad on Third Avenue running over the tracks of the street railroad, and as is well known the avenues and streets of the city are honeycombed below the surface with all manner of pipes and conduits. Hence it is plain that a cost that would be excessive in Syracuse or Worcester or Nashville and their suburbs, to which the experience of the expert of the public service commission was confined (pp. 909, 914), might be entirely reasonable and unavoidable in the city of New York. During the course of this electrification and undoubtedly because of its great cost, the company became insolvent in February, 1900, and a receiver of its property and franchises was thereupon appointed by the United States court.

What was the fate of the Third Avenue Railroad Co. was, as nearly as I can determine from the records, akin to the fate of the predecessors of the New York Pneumatic Service Co.

According to the New York Pneumatic Service Co.'s reports, their cost of construction to March 31, 1912, for New York and Brooklyn, was as follows:

Miles,	26.5230.	
Total cost.....		\$6, 527, 046. 45
Cash cost.....		5, 511, 645. 38
Cost per mile:		
Total cost.....		246, 090. 00
Cash cost.....		207, 806. 00

These costs include development and experiment, franchises, legal expenses, patents, interest, cost of obtaining capital, organization expenses, deficit during early years of operation, and loss by compulsory abandonment of lines incident to changes in location of post offices, substations, etc. A memorandum bearing on this matter of general expenses in the development and construction of the pneumatic tubes was submitted to me under date of February 24, 1913, by the chief engineer of the American Pneumatic Service Co., and this brief, marked "Exhibit F, N. Y. & B. No. 6," is transmitted herewith.

The report of the Post Office Department commission of 1909 gave the estimates of the chief engineer of the American Pneumatic Service Co. on construction costs per mile for New York and Brooklyn as \$83,001; the post office commission themselves gave the estimated cost as \$75,862, plus charge for patents and franchises. These estimates inferred reproduction as of 1908.

Before expressing any definite opinion on the actual construction costs in New York I feel constrained to await further information, if it can be obtained, from the pneumatic company and from the auditors and accountants that have been employed by the commission, because what can be termed the engineering and construction costs entering into this matter probably do not represent over 40

per cent of the total cash cost entered on the books of the company. However, in order that some estimate can be fairly made, under the heading "Probable operating cost under Government ownership" (New York tube system, including Brooklyn lines), I have used both the claimed cash cost of the company for said lines as well as the American Audit Co.'s report of February 14, 1913, which gives the ledger cost of said lines as \$3,244,648.30.

I have not been able to obtain from the officials of the American Pneumatic Service Co. accurate cost statements concerning some of the apparatus originally purchased, built, or installed by the Tubular Dispatch Co., owners of the original New York system. This is illustrated by the inventory to which I have heretofore referred, marked "N. Y. & B., No. 1," and the figures given in the tables of costs of nearly all the apparatus are merely estimates. See inclosed letter of American Pneumatic Service Co., dated March 1, 1913, marked "Exhibit G, N. Y. & B., No. 7."

THIRD. COST OF DUPLICATION OF SYSTEM.

I estimate the probable cost of duplicating the present pneumatic tube system in New York and Brooklyn, including all power generating and station apparatus, at \$2,363,439.

Including equipment, this would be at the average rate of \$87,151 per mile. This figure is based on detailed estimates of costs of tube, boring thereof, special fittings and their boring and grinding, trucking and delivery, trench work, including restoration of surfaces, etc., tube laying, inspecting and engineering, and terminal apparatus. There are street locations where cost would be much above the average and some where it would be less.

For the receiving and dispatching apparatus and special bends and fittings I have used the prices given me by the chief engineer of the American Pneumatic Service Co., since they seem reasonable. Other costs have been independently investigated and obtained. The prices for compressors and blowers have been taken from those paid after competition by the American Pneumatic Service Co. for their New York equipment, because said prices seemed to me fair and reasonable. They have been further checked by the prices paid by the Pneumatic Transit Co. at Philadelphia for similar apparatus, and commercially these prices seem fair, judging by present rates, though cash payments would probably reduce all apparatus costs.

It is worth noting that these estimates, made independently of the cost of installing the Government-owned line between the United States customhouse and appraisers' warehouse, New York, N. Y., check out with reference to the actual cost of line last named within about \$100 per mile.

VALUE OF PRESENT SYSTEM TO GOVERNMENT.

The question of the value to the Government of the present systems is a very complicated matter. In connection with it we have to consider its "value" to the Post Office Department. This, at the present time, seems beyond dispute; but it is a "value" that it is almost impossible to express in dollars and cents. It is the

same kind of value attached to our ability at the present time to go from New York to San Francisco in four and one-half days; or to insure the receipt of a special-delivery letter in a great city within an hour after it has been posted.

A member of the commission suggested, on page 15, that we might consider one of the interstate commerce plans for arriving at the present actual physical valuation, namely, "by taking the cost of construction, the cost of reproduction, and the going value and making an average on the three." Using this formula, we might say that the actual physical valuation of the New York-Brooklyn system could be stated as follows, taking for the time being at least:

First. The American Audit Co.'s ledger construction account, set forth in their Exhibit 1, report of Feb. 14, 1913.....	\$3, 244, 648. 30
Second. Using my estimated probable cost of duplication (see p. 254 of this report).....	2, 363, 439. 00
Third. The going value, i. e., the sum capitalized that would produce the present net revenue of this company received from the rental of the New York-Brooklyn system. This net profit over all expense and interest, etc., charges for their fiscal year ending Mar. 31, 1912, is given as \$62,073.52, and if we capitalized this at 4 per cent, it would make a going principal for the tube system of.....	1, 551, 838. 00
<hr/>	
The aggregate of these amounts equals.....	7, 159, 925. 30
Divided by 3 we would get, as the value, on this basis, of this system.	2, 386, 641. 76

This result would probably be fiercely disputed by the tube company, who would contend that the American Audit Co.'s value took no account of the parent company's charge for profit and loss or of organization expenses, including the expenses incurred in obtaining capital. They would probably also object to item 2, holding that the plant should be capitalized as a going concern on the gross income less operating expenses instead of as given above—i. e., that they should be credited with the sum they pay out as interest.

It is perhaps fair to consider, on the basis of the foregoing formula, the result of a computation on the same basis if we capitalize the New York tube company as a going concern on the gross income less operating expenses. On this basis the formula would work out as follows:

First. The American Audit Co.'s ledger account.....	\$3, 244, 648. 30
Second. Using my estimated probable cost of duplication (see p. 254, this report).....	2, 363, 439. 00
Third. The going value, as the tube company claims it—i. e., the sum capitalized that would produce the present net revenue of said company received from the rental of the New York and Brooklyn system, deducting the operating expenses only, given by the American Audit Co. (see schedule 9) as \$234,565. Deducting this amount from the rental received from the United States Government for the year ending Mar. 31, 1912—i. e., \$449,928—the balance would be \$215,363; and if we capitalize this balance at 4 per cent, it would make a going principal for system named of.....	5, 384, 075. 00
<hr/>	
	10, 992, 162. 30
Divided by 3, on this basis, we would get the value of the New York-Brooklyn system as.....	3, 664, 054. 10

NOTE.—If taxes and insurance were considered as a part of the operating expense, they would add \$11,922.32 to said expense, and the going principal would be reduced proportionately; but neither taxes nor insurance is a Government charge.

If we accepted, in lieu of the American Audit Co.'s figure named, the pneumatic-tube company's statement of cash cost, the formula would work out as follows:

Tube company's stated cash cost.....	\$5, 511, 645. 38
My estimated probable cost of duplication.....	2, 363, 439. 00
The going value, i. e., the sum capitalized at 4 per cent that would produce the present net revenue of this company, received from the rental of the New York-Brooklyn system.....	1, 551, 838. 00

(This going value would not meet the views of the pneumatic-tube company for reasons stated in first computation.)	
The aggregate of these sums amounts to.....	9, 426, 922. 38
Divided by 3, we would get, as the value on this basis, of this system.	3, 142, 307. 46

It will, I think, be clear to the commission, and to those others interested in this matter, that the statements of the president of Yale University, made before the Committee on Interstate and Foreign Commerce, in the House of Representatives, on House bill 12811, February 15-16, 1912, would apply in this case. He said:

Speaking broadly, therefore, I should say that the attempt to ascertain the cost of property in the past with any degree of completeness or accuracy was impracticable.

To determine what we should recommend as a fair payment to the American Pneumatic Service Co. for its New York-Brooklyn properties is a question that must be settled by equity and public policy, as well as by engineering experience and a knowledge of the systems, and I would request that I be permitted to discuss this particular detail further with the commission.

FOURTH. PROBABLE OPERATING COST UNDER GOVERNMENT OWNERSHIP.

Consulting the proof sheets of the American Audit Co.'s report to the commission, of February 14, 1913, received by me February 21, 1913, and using schedule 9 of said report, it is stated that the operating cost of the New York Pneumatic Service Co. for their last full fiscal year is as given in the left-hand column hereinunder. My estimated cost of operation is given in the corresponding right-hand column.

	Tube company's operating expenses.	Government's estimated operating expenses.
General expenses.....	\$23, 484. 66	\$9, 000. 00
Operating expenses, including repairs.....	103, 106. 98	119, 000. 00
Power.....	107, 973. 36	104, 000. 00
Total.....	234, 565. 00	232, 000. 00

In this case, as in similar instances in the other large cities concerned, the Government labor operating charges are estimated as larger than the tube company's by, say, 25 per cent, because the Government properly pays a minimum of, say, \$2 a day to the class of help that would be employed as operators, works them, normally, but 8 hours daily, and allows a vacation period usually of two weeks, also some sick leave. I have, therefore, given due weight to these

conditions in increasing the labor items in operating costs, because the pneumatic tube companies pay a number of their operators less than \$2 and normally require 10 hours' service.

For the moment disregarding the elements of interest and depreciation, if the Government purchased this tube system, the present and estimated costs of the postal pneumatic service in New York would be as follows:

Present cost: Annual rental now paid on 26.5230 miles.....	\$449, 928
Cost of Government operation, including repairs.....	232, 000
Annual difference in favor of Government ownership.....	217, 928

Obviously, before we can compute the interest account, if that factor is to be given weight, the exact purchase price would have to be determined, something we are not in a position at present to do.

If, for the sake of argument and in order to get some basis of comparison, we fixed the purchase price of the systems on the principle adopted by the Public Service Commission of the First District, New York, in considering the Coney Island fare case of the Coney Island & Brooklyn Railroad Co., which placed the ratio of intangible property to tangible property as, say, 9 per cent, and if we accepted, as governing, Exhibit K of the audit company's report to the commission of February 14, 1913, as showing the construction charges to December 31, 1912, for the New York and Brooklyn tubes, the interest account would be as follows:

Ledger cost of construction of New York and Brooklyn tube system..	¹ \$3, 244, 648. 30
Intangible property, at 9 per cent.....	292, 018. 34
	<hr/>
	² 3, 536, 666. 64
Interest on same, at 2.5 per cent.....	88, 416. 00
If we deduct from the difference in favor of Government ownership interest in amount above stated, i. e., \$88,416, the profit to the Government from ownership would amount to.....	129, 512. 00
If, for the sake of argument, we assume we paid the cash cost claimed by the tube company for this system, i. e., \$5,511,645, the interest thereon, at 2½ per cent, would amount to \$137,791; and even on this basis the apparent profit to the Government by its ownership and operation would amount to, annually, above operating cost....	80, 137. 00

I am assuming that probably there would not be paid, at the most, any larger sum than said cash cost claimed by the tube company for the system in question, and therefore it would appear that, say, \$80,137 would be the minimum apparent profit to the Government by its ownership and operation of these tubes. This would be virtually a dividend on the investment made after interest at 2½ per cent, repairs, maintenance, and operation had all been paid for.

For further detailed data as regards operating costs, see Exhibit A, American Audit Co. report, February 15, column New York.

DEPRECIATION.

As regards the element of depreciation, I am not disposed to give it much weight as a practical question in connection with the pneumatic tube companies' plants in the various cities.

¹ This amount does not consider the parent company's charge for profit and loss. To the best of my knowledge this has never been stated.

² This amount is very nearly \$2,000,000 less than the American Pneumatic Service Co.'s claimed cash cost of the New York and Brooklyn systems.

A thorough inspection has shown them generally to be in very good condition.

The tube lines beneath the streets, as heretofore stated, are, generally speaking, in practically as good operating condition as when laid; in fact, as regards the 10-inch lines in Boston, practically in better condition.

It has been well said by an eminent engineer, in the *Journal of the American Society of Mechanical Engineers* for February, 1913, that—

There is a number of kinds of machines which have been but little improved upon during the past period of years, and on account of this slow advance in the state of the art the age alone is of comparatively small importance. Again, the question as to how carefully or intelligently the repairs have been kept up is one that must be considered in determining the present value.

One of the principles of valuing property should be a careful detail investigation of each part or portion of the property in order to determine its actual physical condition and not to be guided too much by the one factor, "age."

In this case I am also disposed to share the opinions set forth by another eminent engineer in the *Annals of the American Academy of Political and Social Science* publication of January, 1911, where it is stated that—

The public is not interested in the amount of depreciation of physical property if it is well maintained in condition to give good service. There would be an economic waste if such depreciation were repaired.

It certainly is fair to say that the physical properties of the New York tube company have been well maintained and are in condition to give good service.

PHILADELPHIA TUBE SYSTEM.

Owner: The Pneumatic Transit Co.

FIRST. PHYSICAL DESCRIPTION.

Installations made from 1893 to 1910.

Routes shown by inclosed map, marked "Exhibit H, plan showing routes of pneumatic-tube lines in the city of Philadelphia, Pneumatic Transit Co., Philadelphia, Pa., August 20, 1908."

Length of tubing in use, 9.999 miles.

NOTE.—For practical purposes in computations, etc., I have regarded this system as 10 miles in length.

Street vaults.....	177
Standpipes.....	0
Sets of bends.....	98
Special fittings, drip parts.....	57
Number of carriers (6 inches, 100; 8 inches, 1,100), total.....	1, 200

Reference is had to Exhibit I, inventory, etc., owned by the Pneumatic Transit Co., February, 1913, from which the following is summarized:

STATION AND POWER EQUIPMENT.

Central post office:

Terminals—

- 4 8-inch gravity transmitters, with time locks.
- 2 8-inch double-decked receivers.
- 1 6-inch gravity transmitter.
- 1 6-inch receiver.
- 1 gauge board and 2 steel racks.

Central post office—Continued.

Power plant—

- 3 Ingersoll-Rand duplex reciprocating compressors, 1906.
- 3 Ingersoll-Rand duplex reciprocating compressors, 1908.
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 40-horsepower motor.
- 1 Westinghouse 30-horsepower motor.
- 1 Westinghouse 16.62-horsepower motor.
- 1 Westinghouse 28.48-horsepower motor.
- 1 Westinghouse 23.17-horsepower motor.
- 12 panel boards.

Station S:

Terminals—

- 2 8-inch gravity transmitters, with time locks.
- 1 8-inch double-decked receiver.
- 1 gauge board, and carrier rack.

Power plant—

- 3 Ingersoll-Rand duplex reciprocating compressors, 1906.
- 2 Westinghouse 40-horsepower motors.
- 1 Westinghouse 50-horsepower motor.
- 6 panel boards.

Station O:

Terminals—

- 2 8-inch gravity transmitters, 1906, 1910.
- 1 8-inch double-decked reciprocating receiver.
- 1 gauge board, 1 carrier rack.

Power plant—

- 2 Ingersoll-Rand duplex reciprocating receivers, 1906.
- 1 Connersville blower, 1910.
- 1 Westinghouse 40-horsepower motor.
- 1 Westinghouse 50-horsepower motor.
- 1 General Electric 35-horsepower motor.
- 6 panel boards.

Station Fairhill:

Terminals—

- 2 8-inch gravity transmitters, 1910.
- 1 8-inch double-decked receiver, 1910.
- 1 gauge board, 1 steel carrier rack.

Power plant—

- 3 Connersville blowers, 1910.
- 1 General Electric 50-horsepower motor.
- 1 General Electric 35-horsepower motor.
- 1 General Electric 25-horsepower motor.
- 6 panel boards.

Station North Philadelphia:

Terminals—

- 1 8-inch cradle transmitter, with time lock, 1910.
- 1 8-inch centrifugal receiver, 1910.
- 1 gauge board, 1 carrier rack.

Power plant—

- 2 Connersville blowers, 1910.
- 1 General Electric 50-horsepower motor.
- 1 General Electric 25-horsepower motor.
- 4 panel boards.

Reading Terminal Station:

Terminals—

- 1 8-inch gravity transmitter, 1909.
- 1 8-inch tilting tube closed receiver, 1909.
- 1 carrier rack.

Penn Square or Broad Street Station:

Terminals—

- 2 8-inch gravity transmitters, 1910.
- 1 8-inch double-decked receiver, 1910.
- 1 gauge board.
- 1 carrier rack.

Penn Square or Broad Street Station—Continued.

Power plant—

- 3 Ingersoll-Rand duplex reciprocating compressors, 1910.
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 35-horsepower motor.
- 1 Westinghouse 23-horsepower motor.
- 6 panel boards.

Station J:

Terminals—

- 2 8-inch gravity transmitters, 1908.
- 1 8-inch double-decked centrifugal receiver, 1908.
- 1 gauge board.
- 1 steel carrier rack.

Power plant—

- 3 Ingersoll-Rand duplex reciprocating compressors, 1903
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 35-horsepower motor.
- 1 Westinghouse 21.6-horsepower motor.
- 6 panel boards.

Station C:

Terminals—

- 1 8-inch gravity transmitter, 1908.
- 1 8-inch centrifugal transmitter, 1908.
- 1 gauge board.
- 1 steel carrier rack.

Power plant—

- 2 Ingersoll-Rand duplex compressors, 1908.
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 21.6-horsepower motor.
- 4 panel boards.

Southwark Station:

Terminals—

- 2 8-inch gravity transmitters, 1908.
- 1 8-inch double-decked centrifugal receiver, 1908.
- 1 gauge board.
- 1 steel carrier rack.

Power plant—

- 3 Ingersoll-Rand duplex reciprocating compressors, 1908.
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 24.5-horsepower motor.
- 1 Westinghouse 21.6-horsepower motor.
- 6 panel boards.

Station D:

Terminals—

- 1 8-inch gravity transmitter, 1908.
- 1 8-inch centrifugal receiver, 1908.
- 1 gauge board.
- 1 steel rack.

Power plant—

- 2 Ingersoll-Rand duplex reciprocating compressors, 1908.
- 1 Westinghouse 50-horsepower motor.
- 1 Westinghouse 21.6-horsepower motor.
- 4 panel boards.

Bourse Station:

Terminals—

- 1 6-inch cradle transmitter, 1908.
- 1 6-inch tilting tube closed receiver, 1893.
- 1 wooden carrier rack.

NOTE.—Necessary air piping, steam piping, electric wiring, tools, lockers, accessories etc., go with each station.

STATION, SHOP, AND STREET EQUIPMENT.

This is as per the very elaborate inventory submitted by the company and marked "Phil. No. 1."

Said inventory comprises a property list, with a statement as to the condition of the articles enumerated, and in most cases a state-

ment of the age, and also the company's statement of the cost so far as same can be determined.

Subject to the notations in said inventory, the going condition of the plant and apparatus is very good. This is illustrated by the report herewith transmitted, marked "Exhibit J, Phil. No. 2," compiled by the office of the postmaster at Philadelphia, of pneumatic-tube stoppages during the calendar year of 1912. Said report gives the dates of all stoppages, the stations affected, the duration of stoppages and causes thereof.

There is later comment on the matter of stoppages in the various systems. There were but 43 of such interruptions in the Philadelphia system during the calendar year of 1912. This is an average of but 4.3 stoppages per mile per year, and, as in the case of most of the other cities, shows good mechanical condition and intelligent operation.

The mechanical condition of the system in Philadelphia has undergone a very thorough inspection at the hands of Mr. George E. Reid, mechanical engineer, of the Supervising Architect's Office, United States Treasury Department, Washington, D. C., who served with me for this purpose.

Under date of February 26, 1913, Mr. Reid reports, when forwarding the checked inventory of the company, that—

Inspection shows the equipment to be in excellent condition. The average time in service is five years; while the average length of service of the tubes is seven years.

Each of the stations having compressors is equipped with a spare compressor and motor with the air piping so arranged that the spare unit can be used in lieu of any other unit in a station that may be temporarily out of service. The spare unit is equipped with a more powerful motor than the others for the purpose of increasing the line pressure to force out a blocked carrier.

As in the other cities, particular consideration has been given the matter of the probable condition of the underground tubes themselves, notably with reference to the older lines.

My views on the general subject of the tubes have been heretofore fully set forth in that portion of the report which treats of New York and Brooklyn.

I have examined several sections of tube and several bends that have been in former service in Philadelphia and found them externally and internally in good condition, showing only very slight evidences of wear. In this connection Mr. Reid reports:

There were also at the store yard several lengths of 8-inch tubes removed from some of the lines for various reasons; and in the lot was a length with the date 1898 cast on the outside, said to have been put down in that year in the Broad Street (Penn Square) line, and taken up in 1910 on account of changes in line location; and after 12 years of service in one of the busiest lines of the system, the wear, as tested by the standard gauges used for boring, is inappreciable, some of the tool marks still being visible.

The exterior coating is apparently intact and as good as when applied.

Another length in the ground six years on another line showed the same characteristics.

In no case are the underground lines in proximity to chemical works or other factories whence seepage could endanger the tubes.

SECOND. PROBABLE COST OF CONSTRUCTION.

This is a matter which, as in the case of New York, is particularly difficult to determine.

In Philadelphia, also, very large sums of money have doubtless been expended in experiments that were included in and charged to early construction, and here also the securing of franchises and the carrying on of street work doubtless involved many expenses that probably have not appeared as items in the books of the building or holding company.

The charge to construction account on the books of the Pneumatic Transit Co. is reported by the American Audit Co., under date of February 14, 1913, in the proofs received by me February 21, 1913, to be approximately \$1,123,000.

The audit company further report that the actual direct cost was approximately \$643,000; said audit company stating further that these figures do not include any charges for interest, franchises, etc.

Under the conditions set forth in the audit company's report I have not been able in the time available to reach a definite conclusion as to what the actual construction costs in Philadelphia have been.

I have referred in my report on New York to a memorandum bearing on this matter of general expenses in the development and construction of the pneumatic tubes which was submitted to me under date of February 24, 1913, by the chief engineer of the American Pneumatic Service Co. and which is inclosed for consideration.

This matter of construction costs, here and elsewhere, I request leave to discuss personally with the commission.

It seems here proper to refer to the following excerpt from the audit company's report of February 14, 1913:

In the engineer's estimate, which we are submitting herewith as Exhibit D, it will be noted that there are charges for "Station equipment" for Broad Street Station and Stations J and C amounting to about \$60,000, as against a charge of approximately \$23,000 for "Station equipment" as shown in Exhibit C (Fairhill and North Philadelphia Station). Our conclusions are that only an appraisal of the physical property will give you any authentic information as to the actual cost of this construction.

Naturally I made some particular investigation of this question and, broadly speaking, the answer is that because of operating conditions the power plants in Broad Street, Station J, and Station C, are of greater capacity and more expensive type than the mechanism required for the Fairhill and North Philadelphia stations.

In Broad Street, for example, there are installed three Ingersoll-Rand duplex reciprocating air compressors that in 1910 cost \$9,300.

At Fairhill there are installed three Connorsville blowers that cost \$4,313.

The motor equipment in Broad Street consists of one Westinghouse direct-current 50-horsepower motor, one similar 35 horsepower and one similar 23-horsepower motor. The aggregate cost of these three motors was \$4,540.

In Fairhill the motor equipment consists of one 50-horsepower General Electric alternating-current motor, one motor of the same type of 35 horsepower, and one motor of the same type of 25 horsepower. The aggregate cost of these three motors was but \$1,748.

The reason given by the company's consulting engineer for the more expensive installation at Broad Street and at Stations C and J is

that at the time these installations were made, as regards motors, it was impracticable for them to obtain alternating current at said stations, and that therefore their apparatus had to be adapted for the use of direct current; that as regards the compressors for the stations named, they were ordered under a contract, that had been in force for some two or three years prior to 1910, with the manufacturers of the Ingersoll-Rand compressors, and at the time this contract was entered into the suitability of the blowers for pneumatic-tube service had not been determined.

The company further holds that the direct-current motors, though more expensive, are better adapted for pneumatic tube compressor work, because of their lower speeds and the ability to make a direct connection to the blower or compressor, whereas with the alternating-current motors their higher rotative speeds make it necessary to use the Morse chain or some other similar type of drive. This the companies regard as somewhat objectionable, a prejudice that I personally do not share.

Going into somewhat further detail in this matter, it is possible that it could have been found that the alternating-current motors could have been obtained at a slower speed and might have been fitted for direct connection. However, this would not have lessened the original cost, and this detail is one of the many score that can come up in the case of any large mechanical or electrical installation and be the subject of divers opinions.

THIRD. COST OF DUPLICATION OF SYSTEM.

I estimate the probable cost of duplicating the present postal pneumatic-tube system in Philadelphia, including all power-generating and station apparatus, at, say, \$724,000:

Of the 10 miles of double tube comprised in this system, I consider that, say, 7 miles represent construction that would probably cost, including station equipment, \$80,500 a mile, making an aggregate of.....	\$563, 500
Of these 10 miles of tube, I also consider that, say, 3 miles represent construction that would probably cost, including station equipment, \$53,500 a mile, making an aggregate of.....	160, 500
Total estimated cost of duplication of system.....	724, 000
This would give an average cost per mile of.....	72, 400

This estimate is largely based on the actual cost of construction work performed by this company since 1907, and is, I think, conservative, though doubtless. with their present lights, they would agree with me that the cost of some of their station equipment might be lessened, as compared with the expense incurred under apparatus contracts made, let us say, in 1907.

In the report compiled in 1908 by the post-office commission, it is stated that the Pneumatic Transit Co.'s construction costs represented an average of \$73.292 per mile for Philadelphia. The committee estimated the cost for reproduction as \$64,647 per mile, plus charge for patents and franchises. These estimates were, as in the case of other cities reported on, based on costs of labor and material in 1908. There are, of course, increases in these items since that time.

VALUE OF PRESENT SYSTEM TO GOVERNMENT.

As in the case of New York, the question of the value to the Government of the present system is a very complicated matter. There is that "value" to the Post Office Department which we can not well express financially; but financially we may consider what the value would be to the Government even though without further discussion and most careful consideration that value can not now be exactly determined.

If we use the interstate-commerce plan, referred to on page 255 of this report for arriving at the present actual physical valuation, namely, "by taking the cost of construction, the cost of reproduction, and the going value and making an average on the three," we might say that the actual physical valuation of the Philadelphia system could be stated as follows, taking for the time being at least:

First. The American Audit Co.'s statement of charged construction account, dated Feb. 14, 1913, page 214.....	\$1, 123, 000
Second. Using my estimated probable cost of duplication (see p. 263 of this report).....	724, 000
Third. The going value, i. e., the sum capitalized that would produce the present net revenue of this company received from the rental of the Philadelphia system. This net profit over all expenses and interest charges for the calendar year of 1912 is given as \$73,150, and if we capitalized this at 4 per cent, it would make a going principal for the tube system of.....	1, 828, 750
<hr/>	
The aggregate of these three sums.....	3, 675, 750
Divided by 3 we would get as the value on this basis of this system.....	1, 225, 250

This result would probably be strongly objected to by the tube company, who would contend that the values I have given above took no account of the parent company's charge for profit and loss or of the intangible assets, concerning which I transmit herewith a brief received by me March 3, 1913, which is transmitted for the consideration of the commission. It is marked "Exhibit K, Phil. No. 3."

Moreover, they probably would raise the same objection that I assume the American Pneumatic Service Co. will to my form of item No. 2, holding that the plant should be capitalized as a going concern on the gross income less operating expenses, instead of the form heretofore used; i. e., that they should be credited with the sum they pay out as interest. Hence it is perhaps fair, at least for the sake of argument, as we have in the case of the New York system, to consider a computation based on the following factors:

First. The Pneumatic Transit Co.'s claim set forth in their brief received Mar. 3, 1913, to the effect that the total value of all the company's property, including both tangible and intangible property, was.....	\$2, 006, 575. 14
Second. My estimated probable cost of duplication.....	724, 000. 00
Third. The going value, as probably the tube company would claim it, i. e., the sum capitalized at 4 per cent that would produce the present net revenue of this company received from the rental of the Philadelphia system, deducting the operating expenses given by the American Audit Co. in Exhibit A of their report of Feb. 14, 1913. Deducting said operating expenses, \$78,438.44, from the said rental, \$169,998.30, there would be left a gross operating profit of \$91,559.86, and if we capitalized this balance at 4 per cent it would make a going principal for the system named of.....	2, 288, 996. 50
<hr/>	
Aggregate of these sums.....	5, 019, 571. 64
Divided by 3, we would get as the value on this basis of this system..	1, 673, 190. 54
(See p. 255 for notes on taxes and insurance.)	

It is possible, of course, to somewhat vary the foregoing computations, but until we can determine exactly what value is to be given intangible assets and the profit and loss account, further theoretical calculations in this case would not seem worth while; and, as I have before stated, it would seem that matters of equity and public policy must receive consideration, as well as the deductions to be obtained from engineering experience and a knowledge of the systems. Hence my request for permission to discuss this particular detail further with the commission.

FOURTH. PROBABLE OPERATING COST UNDER GOVERNMENT OWNERSHIP.

Consulting the proof sheets of the American Audit Co.'s report to the commission, of February 14, 1913, and using Exhibit B of said report, the operating cost of the Philadelphia system for the calendar year of 1912 is given as per the details in the left-hand column hereinunder. My estimated cost of operation is given in the corresponding right-hand column.

	Tube company's operating expenses.	Government's estimated operating expenses.
General expenses.....	\$5,386.89	\$1,200.00
Operating expenses, including repairs.....	33,858.53	43,300.00
Power.....	¹ 39,193.02	² 39,193.02
Total.....	78,438.44	83,693.02

¹ This amount is for electricity purchased.
² This amount includes a charge for power regulator royalties. I am investigating this matter to see if the Government would have to pay it. (Amount \$7,957.72.)

It is estimated that labor under Government operation would involve higher costs because of shorter hours, sick leave, vacation period, and restrictions in the securing of help imposed by civil-service regulations.

Disregarding interest on cost price, and depreciation, the present and estimated cost of the Philadelphia tube service are:

Present cost: Annual rental on 9.999 miles.....	\$169,998.30
Cost of Government operation, including repairs.....	83,693.02

Net difference in favor of Government ownership..... 86,305.28

If the purchase price is fixed on the principle adopted by the Public Service Commission of the First District of New York (see p. 253 of this report), the investment account would be as follows:

Ledger cost of construction.....	\$1,123,000.00
Intangible property, 9 per cent.....	101,070.00
	1,224,070.00
Interest on same, at 2.5 per cent.....	30,601.75
	1,254,671.75

If we deduct the above interest, \$30,601.75, from the net difference between present rental and estimated Government operating cost, \$86,305.28, we have a net saving by Government ownership of \$55,703.53.

If we take the value arrived at hereinbefore (p. 264 of this report)....	\$1, 673, 190. 54
Intangible property, 9 per cent.....	150, 587. 15
	<hr/>
	1, 823, 777. 69
Interest at 2.5 per cent.....	45, 594. 44
	<hr/>
This gives as the aggregate.....	1, 869, 372. 13

The net saving by Government ownership would be \$41,700.84, which would cover all repairs and depreciation and leave a considerable sum for improvements or extensions annually.

The writer desires to amplify these statements before the commission if opportunity permits.

DEPRECIATION.

Remarks made in connection with the New York and Brooklyn lines apply also to the Philadelphia system. I do not regard depreciation as a factor worth consideration, as the inspection of apparatus indicates that this element is insignificant, provided always repairs and maintenance are kept up.

CHICAGO PNEUMATIC-TUBE SYSTEM.

Owner: Chicago Postal Pneumatic Tube Co.

FIRST. PHYSICAL DESCRIPTION.

Installations made from 1903 to date.

Routes shown by inclosed map, Exhibit L, marked "Map of portion of Chicago, Ill., showing route for pneumatic mail service, submitted by Chicago Postal Pneumatic Tube Co., Chicago, 1908.

Length of tubing in use, 9.6017 single, or 19.2034 double miles.

Street vaults, 80.

Bends, 115 pairs, i. e., 231 sets.

Closures, 29; drips, 79; Dutchman, 1.

Number of carriers, 450 per set; total, 975.

Reference is had to Exhibit M, inventory Chicago Postal Pneumatic Tube Co., February 27, 1913, from which the following is summarized:

STATION AND POWER EQUIPMENT.

General post office:

Terminals—

3 sluice-gate open receivers, Nos. 227, 239, 243.

3 gravity transmitters, Nos. 226, 238, 242.

1 motor-driven time lock, No. 288.

Power plant—

1 75-horsepower Laidlaw Dunn Gordon duplex steam compressor, No. 272.

3 75-horsepower Rand Drill Co. duplex steam compressors, Nos. 269, 270, 271.

1 ventilating engine, No. 268.

1 panel board.

3 receiver tanks.

Kinzie Street Station:

Terminals—

1 revolving-valve closed receiver, No. 241.

1 gravity transmitter, No. 240.

La Salle Street Station:

Terminals—

- 2 sluice-gate closed receivers, Nos. 229, 237.
- 2 gravity transmitters, Nos. 228, 236.
- 1 motor time lock, No. 289.

Station U:

Terminals—

- 2 revolving-valve closed receivers, Nos. 231, 235.
- 2 gravity transmitters, Nos. 230, 234.
- 1 motor time lock, No. 285.

Canal Street Station:

Terminals—

- 1 transmitter, No. 232.
- 1 revolving-valve open receiver, No. 233.
- 1 motor time lock, No. 286.

Power plant—

- 1 50-horsepower direct-connected motor-driven Connersville blower, No. 266.
- 1 75-horsepower direct-connected motor-driven Laidlaw Dunn Gordon compressor, No. 265.
- 2 switch panels, Nos. 267, 305.
- 1 receiver tank, No. 264.

Illinois Central Station:

Terminals—

- 2 sluice-gate closed receivers, Nos. 245, 255.
- 2 gravity transmitters, Nos. 244, 254.
- 1 motor-driven time lock, No. 287.

Twentieth Street Station:

Terminals—

- 1 sluice-gate closed receiver, No. 257.
- 1 gravity transmitter, No. 256.

Armour Station:

Terminals—

- 2 revolving-valve open receivers, Nos. 249, 253.
- 2 gravity transmitters, Nos. 248, 252.

Power plant—

- 3 Laidlaw Dunn Gordon duplex belt-driven compressors, Nos. 273, 274, 275.
- 3 90-horsepower General Electric motors, Nos. 276, 277, 278.
- 3 standard panel boards.
- 1 remote control panel board.
- 2 receiver tanks.

Stock Yards Station:

Terminals—

- 1 sluice-gate closed receiver, No. 251.
- 1 gravity transmitter, No. 250.

Harrison Street Tunnel:

- 1 motor.
- 1 pump.

NOTE.—Necessary air piping, auxiliary piping, wiring, tools, etc., go with each equipment.

SHOP AND STREET EQUIPMENT.

[As per inventory marked "Exhibit M, Chicago No. 1."]

Said inventory comprises a property list, with a statement as to the condition of the articles enumerated, and, where practicable, a statement of the age and cost, so far as these can be determined.

It becomes necessary here to state that I had been informed last June, when in Chicago, that the operating condition of the Chicago postal-tube system was not satisfactory and this impression appeared to be confirmed by report of the postmaster herewith inclosed, marked "Exhibit N, Chicago No. 2," giving a statement of the interruptions and suspensions of said tube system between the general post office and its various branches for the calendar year 1912.

As given in said report, I inferred that the total number of said suspensions and stoppages in Chicago was 204, against 98 for New York and Brooklyn in the same period, although the latter system has about two and one-half times the mileage of the Chicago system. Reduced to the basis of stoppages per mile per year, in order to establish some standard of comparison, New York had 4 and Chicago 20, as postmaster reported.

I referred this statement to the general manager of the American Pneumatic Service Co. for comment and explanation. He returned it by stating that the Chicago system of reporting differed from that adopted by the other postmasters. For example, if there was a stoppage in the line serving three stations, under the Chicago method of reporting, it would be reported as three stoppages. He stated that the total number was about 80. Under these circumstances, on February 27, 1913, I returned to the postmaster of Chicago his original report, with a letter of February 26 from said manager of the company, and I asked that the postmaster kindly give consideration to the statements made therein and that the letter be returned to me with any comment he might deem proper. I further sent the postmaster of Chicago a duplicate of a report made by the postmaster of New York, so as to secure, if possible, uniformity in connection with this matter.

When I was in Chicago, on March 5, 1913, the postmaster informed me that further data on the matter was being prepared, but at date of this writing (Mar. 9, 1913) it has not been received. As soon as it is received it will be transmitted to the commission. But even if there were only 80 stoppages, instead of 204, in the Chicago system, such number would indicate rather careless operation or bad mechanical conditions, plus, perhaps, an attempt to crowd the service on the tube serving the three principal stations.

Giving due weight to all the information that I had at hand, I concluded that it would be best to make an exhaustive detailed mechanical examination of all the Chicago equipment, a process not required in the same minute detail by the other systems because of their obviously good going condition. (See general comments on stoppages and derangements in latter portion of this report.)

A most thorough and painstaking inspection was made by Mr. W. A. Richardson, assistant chief engineer of United States public buildings, Chicago, and this detailed report, including repairs recommended, is herewith transmitted, marked "Exhibit O, Chicago, No. 3."

I was unable, of course, from lack of time, to check Mr. Richardson's reports, except as regards the power transmitting and receiving mechanism; and these, so far as it was practicable to do, I did. I am, however, ready to stand behind the accuracy of his detailed statements, and believe that the depreciation which has been charged off against this plant for the past year—i. e., \$38,370—will be required to put it in first-class operating condition. I therefore regard this item of depreciation a real thing, and not a more or less bookkeeping figure, to be considered as an offset against the theoretical taking over of the tubes beneath the streets by the city of Chicago on the expiration of the company's present franchises.

If these tubes were acquired by the United States, I do not believe that the city of Chicago would dispute the Government's possession;

and if they were not acquired, I do not believe that the city would seize them, because I can imagine no more useless property to the municipality. They had obviously better permit said tubes to remain in service and obtain from the company the money now paid in as taxes, which, for 1912, was reported as \$8,384.66.

As regards the condition of the underground tubes themselves, I believe it to be generally good. Under authority granted by the commission, excavation was made on Sherman Street in rear of the La Salle Station and four tubes were exposed. Externally all were practically in as good condition as when laid, date of said laying being given as 1903-4. One 12-foot length of tube and one 11° bend were removed for accurate measurement, field and weather conditions making accurate measurements at site impracticable. The wear observed appeared somewhat greater than that noted in the other cities, and I have directed Mr. Richardson to remeasure these tubes and attempt to determine, if practicable, their original diameter and thickness, as well as the original diameter of the bends concerned, in order that no error may be made in reporting wear. (Exhibit P.)

Mr. Richardson's report, marked "Exhibit Q, Chicago, No. 4," on the general going condition of the Chicago system is inclosed. It will be noted that he states it is in fair operating condition, with the physical condition of the lines good, save as to probable leakage in joints. For further details as to this leakage, see report marked "Chicago, No. 3," page 337. Vaults were found in fair condition except as to drainage. Most of the past month the weather in Chicago has been more or less stormy and severe, and there was more or less water in vaults and freezing of drips. However, when I was in the city on March 4 and 5, the amount of moisture in the lines coming out with the carriers was comparatively small.

It is fair to supplement the foregoing by stating that undoubtedly one of the most serious troubles encountered in the Chicago operation has been the tendency to crowd the line connecting the general post office with three of the principal postal stations. This trouble is now corrected by use of motor-driven time locks, set for about 12 seconds headway. Since these were installed and the operators thus prevented from tripping the receivers by hand and so operating on too close a headway between carriers, troubles incident to overcrowding the line have diminished. But an 8-inch system can not adequately handle between said stations the enormous business that is tendered during rush hours, and while I have given estimates for duplicating the Chicago system, I would not advise said duplication so far as connections between the railroad stations and the general post office are concerned. Moreover, considering present electrical developments, the power installation, notably at the Armour Station, could be improved.

The chief engineer of the American Pneumatic Co. accompanied me to Chicago, and I have an impression that as the result of his personal examination in that city there will be still further improvement in the operating conditions. It is intended, I understand, to supplement many of the old carriers now in service with new ones; in fact, a considerable delivery of same has already been made.

As concerns the Kinzie Street Station, I was informed that this is shortly to be relocated. This will lead to better line construction in the new location and the elimination of the old brass bends now in service.

SECOND. PROBABLE COST OF CONSTRUCTION.

The remarks on pages 252 and 253, this report, in reference to construction costs in New York City apply, to a very considerable extent, to Chicago as well. The tube company gives costs as follows:

Mileage, 9.6017.	
Total cost.....	\$1, 002, 960. 39
Cash cost.....	614, 482. 19
Cost per mile:	
Total.....	104, 456. 00
Cash.....	63, 997. 00

THIRD. COST OF DUPLICATION OF SYSTEM.

In their report of February 14, 1913, the American Audit Co. gives the ledger cost of the Chicago system as \$905,188.76. I estimate the cost of reproducing or duplicating the present Chicago system, under conditions now obtaining, as \$653,318.87. This would be at the average rate of \$68,042 per mile, including the equipment. This estimate is made up on the same basis as the New York estimates have been prepared, giving due weight to the observed and reported existing conditions in Chicago. It has been estimated that in the heart of the city street construction at the present time would be from 20 to 25 per cent more expensive less it was when the tubes were installed in 1903-4. As stated elsewhere, however, I would not recommend the reproduction of all the present lines, because the service to the depots could be improved.

VALUE OF PRESENT SYSTEM TO GOVERNMENT.

This question is no less complicated in Chicago than elsewhere, but under existing conditions I do not think the value to the Post Office Department is as great as it is in New York, Boston, or Philadelphia. However, since this is an intangible asset, it does not find expression in dollars and cents. Working out, however, this matter of "value" in substantially the same manner as for New York we obtain the following:

First. The American Audit Co.'s ledger cost account, set forth in their report of Feb. 14 (Exhibit I).....	\$905, 188. 76
Second. My estimate of probable cost of duplication (see p. 270, this report).....	653, 318. 87
Third. The going value, i. e., the sum capitalized that would produce the present net revenue of the company received from the rental of the Chicago system. This net profit over all expense and interest charges for their fiscal year ending Mar. 31, 1912, is given as \$24, 667.67, and if we capitalize this at 4 per cent it would make a going principal for the tube system of.....	616, 691. 75
<hr/>	
The aggregate of these equals.....	2, 175, 199. 38
Divided by 3 we would get as the value on this basis of this system....	725, 066. 46

NOTE.—Item charged as depreciation is not included, since it is a bookkeeping matter intended to cover the taking over of these tubes by the city of Chicago on expiration of present franchises. I should charge this so-called depreciation item this year against any sum that might be actually paid by the Government, holding that it is required to put the system in first-class condition. This item is given in schedule B of said audit company's report as \$38,370. This is a much larger charge than the real depreciation would be in any one year, assuming repairs to be properly kept up as they have been in other tube systems.

It is perhaps fair, as in the case of New York, to consider on the basis of the foregoing formula the result of a computation if we capitalize the Chicago tube company as a going concern on its gross income less operating expenses only. On this basis the formula would work out as follows:

First. American Audit Co.'s ledger cost account, set forth in their report of Feb. 14.....	\$905, 188. 76
Second. My estimate of probable cost of duplication (see p. 270 of this report).....	653, 318. 87
Third. The going value as the tube company claims it, i. e., the sum capitalized that would produce the net revenue of said company received from the rental of the Chicago system, deducting the operating expenses only, which is given by the American Audit Co. as \$75,164.35. Deducting this amount from the rental received from the United States Government for the year ending Mar. 31, 1912, i. e., \$161,286, the balance would be \$86,121.65, and this capitalized at 4 per cent would equal.....	2, 153, 041. 25
Aggregate of these 3 amounts.....	3, 711, 548. 88
Divided by 3 we get, as the value, on this basis, of this system.....	1, 237, 182. 96
This is \$234,222 above the total cost claimed by the company.	

NOTE.—See note, page 255 of this report, as regards charge for taxes and insurance, which, for Chicago, aggregate \$8,828.49. They would not be recognized as Government charges.

It would be possible to work out several variables on these more or less theoretical bases of the valuation to the Government, but as heretofore stated this is a question that must be settled by equity and public policy as well as by any engineering or auditing data, and this policy will doubtless be settled by the commission after due deliberation.

FOURTH. PROBABLE OPERATING COST UNDER GOVERNMENT OWNERSHIP.

The operating costs of the tube company for their fiscal year ending March 31, 1912, taken from the items given by the American Audit Co.'s schedule B, are as follows, given in the left-hand column, my estimated cost of operation being given in the right-hand column:

	Tube company's operating expenses.	Government's estimated operating expenses.
General expenses.....	\$16, 201. 14	\$1, 500
Operating expenses, including repairs.....	37, 790. 53	49, 921
Power.....	25, 231. 84	20, 184
Total.....	79, 223. 51	71, 605

(There is a slight difference in the American Audit Co.'s addition as stated in proof sheets, schedule B.)
NOTE.—There is an item of \$5,156 covered in as extraordinary expenses in the company's report that I understand is to cover changes in station locations. I have not included this in the foregoing table because it seems obvious in this instance, as in all others, that the matter of moving stations is something that may vary any year. It is hoped, with the new policy of the Post Office Department, however, which, as I understand, is to select thoroughly suitable buildings and make 10-year leases, that the number of future station removals will be less than those in the past.

In this case, as in similar instances in the other large cities concerned, the Government labor operating charges are estimated as larger than the tube company's by, say, 25 per cent, because the

Government properly pays a minimum of, say, \$2 a day to the class of help that would be employed as operators, works them, normally, but 8 hours daily, and allows a vacation period usually of 2 weeks, also some sick leave. I have therefore given due weight to these conditions in increasing the labor items in operating costs because the pneumatic tube companies pay a number of their operators less than \$2 and normally require 10 hours' service.

Disregarding, for the time being, the elements of interest and depreciation, if the Government purchased this tube system, the present and estimated costs of the postal pneumatic service in Chicago would be as follows:

Present cost: Annual rental now paid on 9.6017 miles.....	\$161, 286
Cost of Government operation, including repairs.....	71, 605
	<hr/>
Annual difference in favor of Government ownership.....	89, 681

Depreciation has been covered by a separate recommendation, as heretofore noted.

As regards the element of interest, this can not be determined until a purchase price be fixed. If, for the sake of argument, we took the purchase price as the total cost to the company, i. e., \$1,002,960.30, the interest charge at $2\frac{1}{2}$ per cent would amount to \$25,074. If we deduct this amount from the annual difference in favor of Government ownership, i. e., \$89 681, there would be left \$64,607 as a dividend on the investment named after operating costs and interest charges were met.

BOSTON PNEUMATIC TUBE SYSTEM.

Owner: Boston Pneumatic Transit Co.

Reference is had to Exhibit S, Boston Pneumatic Transit Co. list of equipment, February 5, 1913, from which the following is summarized:

FIRST. PHYSICAL DESCRIPTION.

Installations made 1897 to date.

Routes shown by inclosed map, Exhibit R, marked "Map of Boston, Mass.," showing routes of pneumatic mail tubes, Boston Pneumatic Transit Co., Boston, Mass., 1911.

Length of tubing in use, 8-inch, 4.160 miles; 10-inch, 9.8634 miles; total, 14.0234 miles.

NOTE.—By mutual agreement the Government is paying the company for but 6.7740 double miles, or 13.5480 miles, of service, although 7.0117 miles, or 14.0234 single miles, are in actual use.

In addition to the above, the following tubes are laid in the streets but not in use:

1. Approximately 595 feet of double tube, extending from Clarendon Street and St. James Avenue to former site of Back Bay post office in Copley Square.

2. Approximately 1,815 feet of double tube, extending from Back Bay post office to the old parcel-delivery station on West Newton Street.

3. Approximately 271 feet of double tube, extending from corner Harrison Avenue and Ziegler Street, on Harrison Avenue, to the corner of Harrison Avenue and Dudley Street.

Street vaults.....	24
Sets of bends, approximately 95 pairs, i. e., sets.....	190
Also necessary drips, closures, dutchmen, etc.	
Number of carriers:	
8-inch line, 300 sets, total.....	600
10-inch line, 80 sets, total.....	160
	<hr/>
	760

STATION AND POWER EQUIPMENT.

General post office:

Terminals—

- 1 sluice-gate open receiver, No. 154.
- 1 revolving-valve open receiver, No. 155.
- 2 gravity transmitters, Nos. 153, 156.
- 1 motor time lock, No. 291.

Power plant—

- 1 75-horsepower Rand drill duplex steam compressor, No. 177.
- 2 60-horsepower Rand drill duplex steam compressors, Nos. 178, 179.
- 1 air receiver, No. 180.
- 1 panel board.

North station:

Terminals—

- 1 sluice-gate closed receiver, No. 151.
- 1 gravity transmitter, No. 152.

South station:

Terminals—

- 2 revolving-valve closed receivers, Nos. 157, 159.
- 2 gravity transmitters, Nos. 158, 160.
- 1 motor time lock.

Essex station:

Terminals—

- 2 revolving-valve open receivers, Nos. 163, 165.
- 1 revolving-valve closed receiver, No. 161.
- 2 revolving-valve transmitters, Nos. 164, 166.
- 1 cradle transmitter, No. 162.

Power plant—

- 2 Rand drill belt-driven duplex air compressors, Nos. 184, 186.
- 1 Connersville belt-driven blower, No. 188.
- 3 General Electric 50-horsepower motors, Nos. 183, 185, 187.
- 2 combination remote-control panel boards, Nos. 181, 182.
- 1 standard panel board.
- 1 air receiver, No. 199.

Back Bay station:

Terminals—

- 1 revolving-valve closed receiver, No. 167.
- 1 revolving-valve transmitter, No. 168.

Station A:

Terminals—

- 1 revolving-valve closed receiver, No. 169.
- 1 revolving-valve transmitter, No. 170.

Roxbury Station:

Terminals—

- 1 revolving-valve open receiver, No. 171.
- 1 revolving-valve closed receiver, No. 173.
- 2 revolving-valve transmitters, Nos. 172, 174.

Power plant—

- 2 Rand drill belt-driven duplex compressors, Nos. 190, 192.
- 2 General Electric 50-horsepower motors, Nos. 189, 191.
- 1 air receiver, No. 198.
- 2 panel boards.
- 1 motor-driven time lock.
- 1 power-control apparatus.

Uphams Corner Station:

Terminals—

1 revolving-valve open receiver, No. 176.

1 revolving-valve transmitter, No. 175.

Power plant—

1 Rand drill belt-driven duplex compressor, No. 196.

1 Connersville belt-driven blower, No. 194.

2 General Electric 50-horsepower motors, Nos. 193, 195.

1 panel board.

1 air receiver, No. 197.

NOTE.—Necessary air piping, auxiliary piping, wiring, tools, etc., go with each equipment.

SHOP AND STREET EQUIPMENT.

[As per inventory marked "Exhibit S, B. P. T. Co. No. 1."]

The inventory comprises a list of all property and equipment, with statement of age, cost, and condition of the articles enumerated, so far as same can be determined. As will be seen by the inventory, the general condition of the operating apparatus (receiving, dispatching, and power-plant machinery) is very good, and depreciation has been offset by judicious repairs and renewals from time to time. This is further substantiated by the list of stoppages reported by the postmaster's office, Boston, giving the cause and duration of interruption of service, and the stations affected, during the calendar year of 1912, and marked "Exhibit T, B. P. T. Co. No. 2."

Further comment on the matter of stoppages is made hereinafter, but it may be here recorded that there was but one stoppage per mile of tube in the Boston postal lines during the year 1912, showing good mechanical condition and careful operation.

A thorough examination of the exterior surfaces of tubes exposed in manholes and in streets, where uncovered by excavations for the construction of subways, shows that practically no deterioration has taken place on account of corrosion or electrolysis.

Three hundred feet of 10-inch double tube line, laid in 1901, was exposed in Boylston Street by subway construction, and no appreciable corrosion from any cause was found; in fact, the original exterior skin coat of asphaltum or other material was generally undisturbed. Some of the tubes examined were laid in streets having electric surface car lines with fairly heavy traffic, yet no evidence of electrolysis was found, and it is quite reasonable to assume that no corrosion or pitting from this cause has taken place.

Careful examination and measurement were also made of the interior of sections of tubes removed at random for this particular purpose from lines laid in 1897, and the difference in diameters found between the horizontal and vertical axes, and between the original and present diameters of bore, substantiates the claim that the wear in general on the tubes by reason of carrier friction is inconsequential, and their useful life is probably longer than one generation of mankind.

The condition of tubes, manholes, receiving and dispatching machinery, power plants, etc., is set forth in report marked "Exhibit U, B. P. T. Co. No. 3," made by Mr. Edwin H. Pearson, chief engineer and superintendent of repairs, United States public buildings, Boston, Mass., after a thorough and exhaustive examination of same, and confirms my own personal knowledge of the condition of this equipment. I personally inspected tubes excavated on February 20, 1913.

SECOND. PROBABLE COST OF CONSTRUCTION.

The remarks made on page 252 of this report in connection with the tube systems in New York and Brooklyn apply equally well to conditions in Boston.

According to the Boston Pneumatic Transit Co.:

Total construction cost per mile was.....	\$62,358
Cash cost per mile.....	56,750

Report of the post-office commission, 1909, gave as follows:

Estimated cost for duplicating system per mile, not including patent rights and franchise.....	\$64,952
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The chief engineer of the American Pneumatic Service Co. estimates the cost per mile as \$65,329, which includes all items of cost of every nature, such as franchises, legal expenses, patents, interest, costs of obtaining capital, and losses due to lines abandoned incident to changes in location of substations. Obviously all of these items are legitimate charges, but are difficult to secure or estimate when evaluating completed equipment. It is therefore reasonable to assume the figure given by the chief engineer of the American Pneumatic Service Co. is a fair statement of cost per mile.

On this basis per mile the cost of the entire installation in Boston, including station, power plant, and street equipment, totals \$442,539.

THIRD. COST OF DUPLICATION OF SYSTEM.

Based upon detailed estimates of costs of tubes, boring, special fittings, trucking and delivery, laying, trench work, including restoration of street surfaces, inspecting, engineering and terminal apparatus, I estimate the present entire equipment in Boston could be duplicated for \$426,762. (Cost per mile on this basis, \$62,704.)

The prices for receiving and dispatching apparatus, special bends, fittings, and manholes are based on figures supplied by the American Pneumatic Service Co. and appear reasonable. Costs of compressors, blowers, and other station apparatus are those paid by the company in open competition, checked by costs of similar apparatus in New York and Philadelphia, as well as costs of the present Government-owned line in New York.

VALUE OF PRESENT SYSTEM TO GOVERNMENT.

By taking an average of the cost of construction, the cost of reproduction, and the going value we have:

First. American Audit Co.'s ledger construction account, set forth in their Exhibit I, of Feb. 14, 1913.....	\$399,585.80
Second. Using my estimated probable cost of duplication.....	426,762.00
Third. The going value, or capitalized sum that would produce the present net revenue received by the company from the rental of the Boston system. This net profit over all expenses and interest charges for their fiscal year ending Mar. 31, 1912, is given as \$44,400.99, which, capitalized at 4 per cent, makes a going principal for this system of..	1,110,024.75
	<hr/>
	1,936,372.55
Divided by 3, gives as a value, on this basis.....	645,457.52

If we consider a computation based on the following factors, we get the results as stated below:

First. The American Audit Co.'s ledger account.....	\$399, 585. 80
Second. Using my estimated probable cost of duplication (see p. 275 of this report).....	426, 762. 00
Third. The going value, as represented by the sum capitalized that would produce the present net revenue received from the rental of the Boston system, less operating expenses given by the American Audit Co. in Exhibit A of their report of Feb. 14, 1913. Deducting said operating expenses, \$46,290.64, from the said rental, \$115,158, there would be a gross operating profit of \$68,868.36, and if we capitalized this balance at 4 per cent it would make a going principal for the system named of.....	1, 721, 709. 00

Aggregate of these sums.....	2, 548, 056. 80
Divided by 3, we would get as the value on this basis of this system...	849, 352. 27

NOTE.—The value of the Boston installation, based on this method, is probably entirely too high; but these figures are given, as the same method was employed for comparison of the systems in New York and other cities.

Or, again, if we accept the tube company's cash cost as.....	\$384, 418. 12
My estimated cost.....	426, 762. 00
The going value—i. e., the sum capitalized at 4 per cent that would produce the present net revenue received from rental of Boston tube system.....	1, 110, 024. 75

Aggregate of the three sums.....	1, 921, 204. 87
Divided by 3, we have, as the value on this basis.....	640, 401. 62

(See p. 255 for notes on taxes and insurance.)

FOURTH. PROBABLE OPERATING COST UNDER GOVERNMENT OWNERSHIP.

From proof sheets of the American Audit Co.'s report to the commission of February 14, 1913, schedule 1, it is found that the operating cost of the Boston Pneumatic Transit Co.'s system for their last full fiscal year is as given below, together with the estimated cost of operation by the Government:

	Tube company's operating expenses.	Government's estimated operating expenses.
General expenses.....	\$4, 150. 60	\$4, 103. 00
Operating expenses, including repairs.....	24, 867. 75	32, 645. 00
Power.....	17, 272. 29	¹ 15, 545. 00
	46, 290. 64	52, 293. 00

¹ Less 10 per cent.

It is estimated that labor under Government operation would involve higher costs because of shorter hours, sick leave, vacation period, and restrictions in the securing of help imposed by civil-service regulations.

Disregarding interest on cost price and depreciation, the present and estimated costs of the Boston tube service are:

Present cost: Annual rental on 6.774 miles.....	\$115, 158
Cost of Government operation, including repairs.....	52, 293

Net difference in favor of Government ownership.....	62, 865
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If the purchase price is fixed on the principle adopted by the Public Service Commission of the First District of New York (see p. 253 of this report), the investment account would be as follows:

Ledger cost of construction.....	\$399, 585. 80
Intangible property, 9 per cent.....	35, 962. 72
	<hr/>
	435, 548. 52
Interest on same, at 2½ per cent.....	10, 888. 71
	<hr/>
	446, 437. 23

If we deduct the above interest, \$10,888.71, from the net difference between present rental and estimated Government operating cost, \$62,865, we have a net saving by Government ownership of \$51,976.29 and a return of first cost in eight years.

This particular installation would return a handsome dividend to the Government on the above basis.

If we take the value arrived at hereinbefore (p. 276 of this report).....	\$640, 401. 62
Intangible property, 9 per cent.....	57, 636. 15
	<hr/>
	698, 037. 77
Interest at 2.5 per cent.....	17, 450. 94
	<hr/>

This gives as the aggregate..... 715, 488. 71

The net saving by Government ownership would repay this aggregate in a little less than 14 years.

The writer desires to amplify these statements before the commission if opportunity permits. (See minor differences in Boston costs, schedule B and schedule 1, American Audit Co.'s report.)

DEPRECIATION.

Remarks made in connection with the New York and Brooklyn lines apply also to the Boston system. I do not regard depreciation as a factor worth consideration, as the inspection of apparatus indicates that this element is insignificant, provided always repairs and maintenance are kept up.

ST. LOUIS PNEUMATIC TUBE SYSTEM.

Owner: St. Louis Pneumatic Tube Co.

Reference is had to Exhibit W, St. Louis Pneumatic Tube Co. list of equipment, February 5, 1913, from which the following is summarized:

FIRST. PHYSICAL DESCRIPTION.

Installation made in 1903-4.

Routes shown by inclosed map, Exhibit V, marked "Map of portion of St. Louis, Mo., showing route of pneumatic mail service."

Length of tubing in use:	
Double miles.....	3. 8930
Single miles.....	1. 9465
Street vaults.....	5
Sets of bends, 25 pairs, i. e., sets.....	50
Drips.....	20
Test valves.....	6
Number of carriers.....	528

STATION AND POWER EQUIPMENT.

Central station:

Terminals—

- 2 revolving-valve open receivers, Nos. 353, 354.
- 2 gravity transmitters, Nos. 355, 356.

Power plant—

- 1 75-horsepower Laidlaw Dunn Gordon duplex steam compressor, No. 351.
- 1 75-horsepower Rand Drill Co. duplex steam compressor, No. 352.
- 1 gauge board.
- 1 air receiver, No. 362.

General post office:

Terminals—

- 1 revolving-valve closed receiver, No. 350.
- 1 gravity transmitter, No. 358.

Bridge post office:

Terminals

- 1 revolving-valve closed receiver, No. 359.
- 1 gravity transmitter, No. 360.

NOTE.—Necessary air piping, auxiliary piping, wiring, tools, etc., go with each equipment.

SHOP AND STREET EQUIPMENT.

[As per inventory marked “St. Louis No. 1.”]

This inventory comprises a property list, with statement as to condition of articles enumerated, together, where practicable, with statement of age and cost, so far as same can be determined. The general going condition of the plant and apparatus appears to be very good. This is illustrated by report of stoppages in tube system for calendar year 1912, made by the postmaster, St. Louis, dated February 20, 1913, marked “Exhibit X, St. Louis No. 2,” herewith inclosed, which report gives the date, location, duration, and cause of said stoppages. There were but 11 stoppages during the year. This is at rate of 6 per mile per year.

The condition of the underground tubes in St. Louis is believed to be substantially as good as when first installed. This opinion is based on freedom from stoppages, on the fact that the St. Louis water department reports no appreciable damage done from electrolysis in the district covered by the tubes, that voltmeter tests have indicated only a fraction of a volt of stray current pressure found anywhere, and that the soil through which the St. Louis lines are laid is very free from agents producing chemical action in cast-iron pipe. So far as known, no street work has been done which would damage the tubes since same were laid.

The mechanical engineer and inspector who assisted me in St. Louis is Chief Engineer Edwin S. Hallett, of the United States public buildings in that city. The favorable result of his inspections was confirmed by my own examinations. A report from Mr. Hallett is inclosed, marked “Exhibit Y, St. Louis No. 3.”

SECOND. PROBABLE COST OF CONSTRUCTION.

The American Audit Co.’s report dated February 14, 1913, to the commission gives the total construction cost in St. Louis at \$149,489.11. According to the American Pneumatic Co. the cost is given as

Total cost.....	\$275, 121. 99
Cash cost.....	108, 856. 95

Subject to further conference with the commission and with the American Audit Co., I infer the latter's figure fairly represents the actual construction cost with which the company may be credited, plus a proper profit and loss account.

THIRD. COST OF DUPLICATION OF SYSTEM IN ST. LOUIS.

The probable cost of duplicating the present pneumatic system in St. Louis, including all power and station apparatus, I estimate at \$123,000. Including equipment, this is at the rate of, say, \$62,000 per mile. But I would not duplicate the present line.

This figure, as in the case with regard to New York, is based on detailed estimates of cost of tube, boring thereof, special fittings and their boring and grinding, trucking and delivery, trench work, including restoration of surfaces, etc., tube laying, inspecting and engineering and terminal apparatus. For receiving and dispatching apparatus and special bends and fittings I have used the prices given me by the chief engineer of the American Pneumatic Service Co., since they seemed reasonable. Other costs have been independently estimated and obtained. Prices for compressors and blowers have been taken from those paid, after competition, by the American Pneumatic Service Co. for similar apparatus. Said prices seem commercially reasonable, judging by present rates, considering the long credit given.

VALUE OF PRESENT SYSTEM TO THE GOVERNMENT.

If we should accept the statement of the American Pneumatic Service Co. that the total cost of the St. Louis system was \$275,121.99, and if we assume that the Government took said system over at that price, and if the interest account be considered, then the proposition would stand as follows:

Interest on \$275,121.99, at 2.5 per cent.....	\$6, 878. 04
Deducting this interest, \$6,878.04, from \$10,085, the amount of the annual difference in favor of Government ownership, would give, as the Government profit on the investment.....	3, 206. 96

I do not think it unfair to assume that this amount would represent a minimum dividend free and clear of all expenses. This might be said to be the value of the tube system to the Government, plus the practical value to the Post Office Department and the people, something which, as has heretofore been stated, can not be expressed in the terms of dollars and cents.

FOURTH. PROBABLE OPERATING COST UNDER GOVERNMENT OWNERSHIP.

Consulting the proof sheets of the American Audit Co.'s report to the commission of February 14, 1913, received by me February 21, 1913, and using schedule 4 of said report, the operating cost of the St. Louis Pneumatic Tube Co. for the last full fiscal year is given in the left-hand column hereinafter. My estimated Government cost of operation is given in the corresponding right-hand column.

	Tube com- pany's oper- ating ex- penses.	Govern- ment's esti- mated oper- ating ex- penses.
General expenses.....	\$6,353.56	\$500
Operating expenses, including repairs.....	12,814.02	18,005
Power.....	4,952.76	4,500
	24,120.34	23,005

In this case, as in similar instances in the other large cities concerned, the Government labor operating charges are estimated as larger than the tube company's by, say, 25 per cent, because the Government properly pays a minimum of, say, \$2 a day to the class of help that would be employed as operators, works them, normally, but eight hours daily, and allows a vacation period usually of two weeks, also some sick leave. I have therefore given due weight to these conditions in increasing the labor items in operating costs because the pneumatic-tube companies pay a number of their operators less than \$2, and normally require 10 hours' service.

Disregarding, for the time being, the elements of interest and depreciation, if the Government purchased this tube system, the present and estimated costs of the postal pneumatic service in St. Louis would be as follows:

Present cost: Annual rental now paid on 1.9465 miles.....	\$33,090
Cost of Government operation, including repairs.....	23,005
Annual difference in favor of Government ownership.....	10,085

Depreciation is covered, as heretofore noted for New York, by repair account. If interest is to be considered as a factor, and if we fix the purchase price at the American Audit Co.'s ledger cost of \$149,489.11, the interest on this sum, at 2.5 per cent, would be \$3,737.22, and this, deducted from the annual saving by Government ownership, would leave for Government profit on the investment above operating expenses, repairs, and maintenance, \$6,347.78.

As in other cases, I request that I be allowed to discuss with the commission the matter of "value" to the Government.

I feel constrained to state, however, that under the conditions that have developed since the occupancy of the new general post office, adjacent to the Union Station, in October, 1912, the tube system is not accomplishing what it should if its value to the Government is to be considered; and the extension of said system, I am informed by the postmaster and by representatives of the principal newspapers of St. Louis, is very strongly desired by the business interests of that city.

To make a tube system for the center of St. Louis effective, about 2.1 miles of new construction should be undertaken. This new construction would virtually form the southern side of a loop of which the present system would form the northern side.

The suggested addition is indicated in blue on the inclosed map, showing route of pneumatic mail service in St. Louis. Its estimated cost would probably not exceed \$60,000 per mile, including equipment.

It will be noted that at present only the general post office, the old post office, and the Bridge Station are connected, whereas the pro-

posed construction would serve to connect up the Merchants' Exchange Station, Cupples Station, and Progress Station, in addition to the present system; and since these comprise the principal stations in the heart of the city, there is no question but what the bettered service would be appreciated by the business community and would, I believe, be justified.

In this case I have gone beyond the prescribed routine followed in other cities, because, considering the present system alone, I do not think the Government would be justified in duplicating it, more especially as administrative and other conditions seem to have made it necessary that the connections to the new general post office be through the Union Station; whereas had the construction and occupancy of this office preceded the laying out of the westerly portion of the present tube line, said line would have been run from the corner of Pine and Eighteenth Streets directly down to the general post office, and about 2,348 feet of mileage would have been saved thereby.

RELIABILITY OF SYSTEMS.

There follows a statement of the number of interruptions or stoppages in the pneumatic-tube systems of New York, including Brooklyn, Philadelphia, Boston, and St. Louis.

Chicago is for the present omitted because of nonreceipt of a possibly revised report from the postmaster of said city, heretofore referred to. It will be later furnished.

The record for the four cities first named I consider excellent.

In order to obtain a common basis of comparison, we may consider the number of stoppages per mile per year, and these would be as follows:

New York and Brooklyn.....	4
Philadelphia.....	4.6
Boston.....	1
St. Louis.....	6
Government-owned line between United States customhouse and United States appraisers' warehouse, New York City.....	1

The two stoppages in the Government-owned tube in New York were due to moisture freezing within during Sundays in February, 1912, and during the coldest weather New York City has had for many years.

Causes of interruption in pneumatic-tube system.

NEW YORK.

	Number.	Per cent.
Accidents to receiving mechanism.....	17	17.50
Accidents to transmitting mechanism.....	12	12.40
Blocked by carriers in tubes (open or defect).....	41	42.30
Tubes blocked by street settlement or disturbance.....	14	14.40
Tubes blocked by moisture freezing within.....	4	4.10
Disarrangement of operating mechanism.....	6	6.20
Alterations in lines.....	3	3.10
Total.....	97	100.00

Causes of interruption in pneumatic-tube system--Continued.

PHILADELPHIA.

	Number.	Per cent.
Accidents to receiving mechanism.....	8	18.60
Accidents to transmitting mechanism.....	11	25.60
Accidents to compressors and motors.....	2	4.70
Failure of current supply from outside.....	9	20.90
Blowing fuses and circuit breakers.....	4	9.30
Tubes blocked by carriers (open or defect).....	5	11.60
Tubes blocked by street settlement or disturbance.....	3	7.00
Tubes blocked by moisture freezing.....	1	2.30
Total.....	43	100.00

BOSTON.

Accidents to receiving mechanism.....	1	12.50
Accidents to transmitting mechanism.....	1	12.50
Accidents to compressors and motors.....	2	25.00
Tubes blocked by carriers (open or defective).....	1	12.50
Disarrangement of operating mechanism.....	2	25.00
Tubes blocked by moisture freezing.....	1	12.50
Total.....	8	100.00

ST. LOUIS.

Tubes blocked by carriers (open or defective).....	3	27.30
Tubes blocked by street settlement or disturbance.....	1	9.10
Disarrangement of operating mechanism.....	1	9.10
Unknown.....	6	54.50
Total.....	11	100.00

CHICAGO.

Accidents to receiving mechanism.....	8	9.52
Accidents to transmitting mechanism.....	9	10.72
Accidents to compressors and motors.....	3	3.57
Blowing fuses and circuit breakers.....	1	1.20
Carriers blocked in tubes (open or defect).....	30	35.71
Tubes blocked by street settlement or disturbance where difficulty was known or reported.....	8	9.52
Reported as "unknown," but probably due to tubes getting out of line or breaking, incident to reported leaks in city water mains, or settlement of filled ground, breaking of sheet piling, foundation supports, etc.....	22	26.19
Probably due to carelessness of operators.....	3	3.57
Total.....	84	100.00

REMARKS ON DUPLICATION OF SYSTEMS.

It has, of course, been necessary to consider the cost of duplicating the present systems; but to be forced to duplicate because of inability to purchase them at a fair price, if Government ownership be determined on, would involve waste of human accomplishment and of a large investment, for the present tube systems, except perhaps part of the 10-inch line in Boston, would be next to useless to anyone save the United States Post Office Department. Besides the physical reconstruction in the heart of the business centers of great cities would be a matter of serious difficulty and cause much public inconvenience to populations who for years have suffered from previous lack of consistent policies and foresight in the conduct of municipal works so far as they relate to the reconstruction of streets and of the

subways, pipes, ducts, and wires beneath them. Some photographs transmitted of street work in New York illustrate the difficulties referred to and the wisdom of avoiding needless disturbance of traffic, with accompanying risk to public health and welfare.

I believe the estimates on cost of duplication are fair for each system; but it should be borne in mind that until bids are actually taken for special work of this description it is next to impossible to determine how contractors would look upon it. Work of this character heretofore put on the market has never attracted general competition.

The installation of the pneumatic-tube line owned by the United States Treasury Department between the United States appraisers' warehouse and the United States customhouse, New York, N. Y., was thoroughly advertised in January, 1910, for a considerable period, and tenders were solicited not only by customary advertisement and the posting of notices in public places, but also by letters, and yet but one bid was received, i. e., that of the New York Pneumatic Service Co.

If work of this kind along a route not unduly difficult failed to attract any competition when engineering contracting work in general in New York was rather dull, it would appear that this condition would be a factor that we must consider when contemplating duplication.

DATA CONCERNING GOVERNMENT-OWNED 8-INCH-DIAMETER PNEUMATIC TRANSMISSION TUBES BETWEEN UNITED STATES APPRAISERS' WAREHOUSE AND UNITED STATES CUSTOMHOUSE, NEW YORK CITY.

The route, which is diagonally across Battery Park and thence up Washington Street to the appraisers' warehouse, is shown on attached plan.

Tubes constructed during 1910; started for regular operation, January, 1911.

Appropriation for construction.....	\$175, 000
Contract cost, including electric conduit and all apparatus and equipment.....	\$174, 150
Number of tubes.....	2
Length of each tube between outside building lines.....feet..	10, 864
Total length of each tube, including the lines in interior of buildings, about	feet.. 11, 000
One electric conduit, 4 inches in diameter, containing a pull wire, was laid with these tubes.	
There is one set of transmitting apparatus and one set of receiving apparatus of American Pneumatic Service Co.'s type, located in both appraisers' warehouse and customhouse.	
Number of rotary blowers (1 steam driven, at appraisers' warehouse; 1 electric driven, at customhouse).....	2
Maximum horsepower required for operation of each tube, at maximum speed and capacity.....	55
Total horsepower for circuit, at maximum speed and capacity.....	110
Maximum speed, say.....miles..	30
Air pressure required for 30-mile per hour speed.....pounds..	8-9
Volume of air per minute for 30-mile speed.....cubic feet..	1, 300-1, 400
Average horsepower required for normal operation of each tube.....	25
Total horsepower for circuit, normal use.....	50
Normal speed of carriers, miles per hour.....	25
Maximum practicable rate of dispatch of carriers, say headway seconds..	10
Ordinary full-speed dispatch.....do....	15
Average present normal dispatch of carriers between customhouse and appraisers' warehouse is one every 4 minutes.	
It will thus be seen that if these tubes should be incorporated in New York postal system, their capacity could be easily increased.	

Annual cost of operation of this system:

For electric power purchased at customhouse.....	\$1, 502. 00
NOTE.—If we ourselves generated this current, the cost would be of said electric power, about \$1,000.	
Cost of our generated steam power at United States appraisers' warehouse, say.....	1, 000. 00
Annual cost of repairs and supplies, including new carriers.....	672. 00
Wages of three operators.....	2, 520. 00

Based on calendar year of 1912, total cost..... 5, 694. 00

It is to be noted that without greatly increasing the operating expense, the duty of these tubes could, as stated, be more than trebled if they were connected with the post-office system, experience showing that the increase in horsepower required does not largely increase with the number of carriers dispatched within reasonable limits, and it is obvious that an operator has to be paid his stipulated per diem wage whether he handles carriers at the rate of one in four minutes or four in one minute, although, of course, one man without relief could hardly keep up this rate of dispatch for eight hours.

Contrary to the practice when first started, the customs authorities are now transmitting all the brokers' documents and papers via these tubes, and as occasion requires the customs business of said tubes will obviously increase without reference to a possible future post-office connection.

The legislative and municipal franchises that made possible the installation of the Government-owned tube in New York were handled by the collector of the port and the supervising chief engineer of United States public buildings at New York, without any expense to the Government, and so far as I know there was no direct expense in securing the legislation. This condition would probably obtain with reference to any future Government extension or construction, at least in New York.

With the Government operating there may arise in the future the necessity of payment for permits for street openings, and for city inspectors, watchmen, and the like. Though we have had no charges of this sort to meet for two years, if we acquired the postal systems they would doubtless form an element that would have to be considered. Normally, however, these charges would be cared for in the amount allotted for repairs.

ADDITIONALLY SUBMITTED BRIEFS OR MEMORANDA.

There is inclosed herewith a letter dated February 25, 1913, from the chief engineer of the American Pneumatic Service Co., marked "Exhibit Z," stating that among the serious factors entering into their past construction costs is the value of the abandoned tube equipment in the various cities. Excluding Philadelphia, this is given as:

For Boston.....	\$8, 700. 64
For New York.....	144, 879. 80
For Chicago.....	34, 718. 00
For St. Louis.....	5, 043. 32
Total.....	193, 341. 76

He also states that there have been heavy expenditures on the buildings in which the post-office stations are located that have

tube connections, and that in some cases it has been necessary for the company to tear out and rebuild partitions and floors, and make other alterations before the tubes and machinery could be installed.

The statements made in this letter are I believe worthy of the attention of the commission, and should be given weight when the matter of intangible assets and past costs are considered.

There is also transmitted an article marked "Exhibit Za," prepared by Mr. M. L. Emerson, manager of the American Pneumatic Service Co., dated November 15, 1912, and entitled, "Would the installation of larger pneumatic tubes or automatic electric railway tunnels restrict to any extent the further installation of 8-inch diameter pneumatic tube systems?"

The attention of the commission is respectfully invited to Mr. Emerson's conclusions.

Generally speaking, I agree with his statements as to the size of tube or tunnel to be used between different points.

It is practically a question of cost both as regards construction and operation, and I think it impracticable to lay down a hard and fast rule.

Normally between postal stations I believe that the 8-inch tube sufficiently answers the purpose, both because of the elements of cost of construction and ease of operation.

We have postal stations in all the large cities where it would be difficult and inconvenient to install, handle, and operate terminal mechanism for tubes larger than 8 inches.

I believe that a system akin to that for which bids are now being taken in London, and which infers what is really a small tunnel trolley line with an automatically controlled, electrically propelled vehicle carrying, say, 200 pounds of mail matter, with a length of carrier of about 6 feet and a diameter of from 24 to 30 inches, would be found of great service between points like the Grand Central Station Depot and the New Pennsylvania Depot in New York City, and between depots of this character and general post offices in the great cities; but the expense of construction, which is likely to be from \$300,000 to \$400,000 per mile, and the physical difficulties that are likely to attend installation of this type in cities such as New York, Chicago, Boston, or Philadelphia, must be given due consideration, and will obviously limit this aid to the postal service for some years at least.

Systems of the kind referred to, however, would have the great advantage of doing away with a vehicular transportation of mails, and thus help to lessen the congestion that is becoming so vital a question in our great cities.

I shall be glad, on the request of the commission, to more fully cover any point discussed in this report, which I have tried to make as brief as the importance of the subject demands.

In closing, I beg to state that the tube companies concerned have courteously given all information called for that it was in their power to furnish, and I desire to record my appreciation of the assistance rendered me by the Government engineers employed, my office, and others concerned in this work.

ALFRED BROOKS FRY,
Consulting Engineer.

Data concerning pneumatic-tube companies.

	Philadelphia.	Boston.	New York.	Chicago.	St. Louis.	Total.
Mileage.....	9.999	6.774	26.5230	9.6017	1.9465	54.8442
Rental.....	\$169,998.30	\$115,158	\$449,928	\$161,286	\$33,090	\$929,460
Physical condition.....	(¹)	(²)	(²)	(³)	(¹)	-----
Stoppages per mile of tube, 1912.....	4.3	1	4	20(?)	6	-----
American Audit Co.'s ledger cost account.....	\$1,123,000.00	\$399,585.80	\$3,244,648.30	\$905,188.76	\$149,489.11	\$5,821,911.97
Tube companies' claimed total cost.....	\$2,006,575.14	\$422,408.06	\$6,527,046.45	\$1,002,960.39	\$275,121.99	\$10,234,112.03
Estimated cost of duplication of systems.....	\$724,000.00	\$426,762.00	\$2,363,439.00	\$653,318.87	\$123,000.00	\$4,290,519.87
Company's reported annual cost of operation.....	⁴ \$78,438.44	\$46,290.64	\$234,565.00	\$79,223.51	\$24,120.34	\$462,637.93
Government's estimated annual cost of operation.....	⁴ \$83,693.00	\$52,293.00	\$232,000.00	\$71,605.00	\$23,005.00	\$462,596.00
Estimated Government saving per annum, excluding interest, assuming purchase, i. e., deducting estimated cost Government operation from annual rentals.....	\$86,305.28	\$62,865.00	\$217,928.00	\$89,681.00	\$10,085.00	\$466,864.28
Probable annual Government saving, as above, considering interest as 2½ per cent, based on probable maximum purchase price.....	\$41,700.84	\$51,976.29	\$80,137.00	\$64,607.00	\$3,206.96	\$241,628.09

¹ Good to excellent.

² Good.

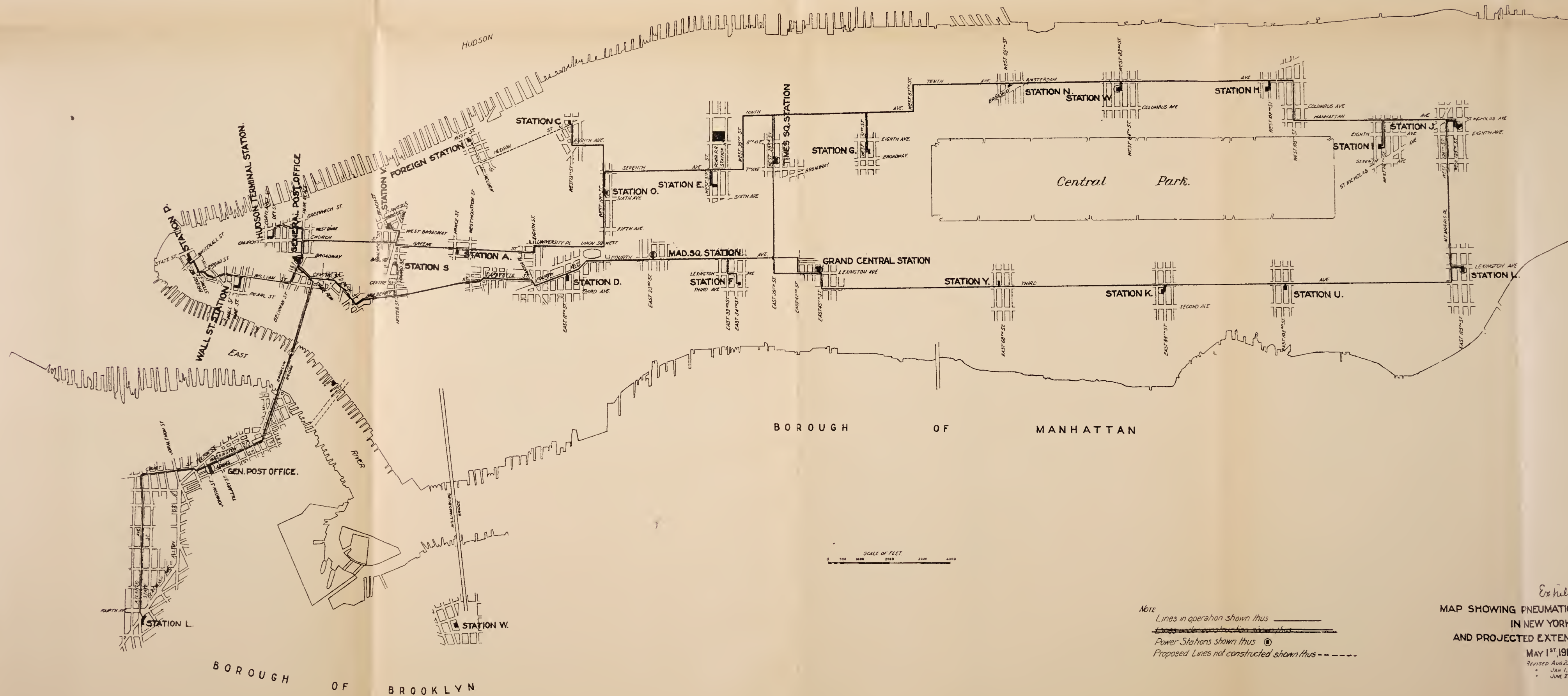
³ Fair; requires repairs.

⁴ Includes power regulator royalties, \$7,957.72. The Government might not have to pay these.

NOTE.—For estimated “value” of each system, see text of report for each city.

A. B.

MARCH 10, 1913.



NOTE
 Lines in operation shown thus ————
 Lines under construction shown thus -----
 Power Stations shown thus **⊙**
 Proposed Lines not constructed shown thus -----

Exhibit A.
 MAP SHOWING PNEUMATIC MAILTUBE LINES
 IN NEW YORK, N.Y.
 AND PROJECTED EXTENSIONS THERETO.

MAY 1ST, 1910.
 Revised AUG 23/1910
 JAN 1, 1911
 JUNE 27, 1912

EXHIBIT B, N. Y. & B. NO. 1.

List of equipment, Feb. 5, 1913, New York Pneumatic Service Co.

NOTE.—Where exact date of purchase or installation of mechanism or equipment is unknown, approximate date is stated as nearly as possible. Where cost was not ascertainable, column is left blank.

	Year in- stalled.	Cost.	Condition.
SHOP EQUIPMENT.			
1 tube lathe No. 83.....	1908-1910	\$400	Good.
2 lathes (Eng. lathe No. 81; speed No. 84).....		500	Do.
1 large drill press No. 82.....		200	Excellent.
1 small drill press No. 85.....		100	Do.
1 milling machine No. 91.....		500	Do.
1 grinder No. 86.....		15	Good.
Soldering apparatus.....		50	Do.
Shop tools.....		500	Do.
Racks, carrier parts, machine parts, etc.....	1910-1912	500	Do.
Shop motor and starter No. 92.....	1908	250	Do.
STREET EQUIPMENT.			
Force pumps, rods, picks, shovels, etc.....	1908	150	Good.
Manhole covers, spare bends, closures, and other fittings.....	1908	200	Do.
Emergency dutchmen (1 found).....	1908	50	Do.
EQUIPMENT.			
<i>Brooklyn—Station L.</i>			
Terminals:			
1 sluice-gate closed receiver No. 7.....	1908	950 (?)	Excellent.
1 gravity transmitter No. 6.....	1908	450 (?)	Do.
<i>Brooklyn general post office.</i>			
Terminals:			
2 sluice-gate open receivers Nos. 3 and 5.....	1898-1908	{ ¹ 900 720	1 good. 1 excellent.
1 gravity transmitter No. 4.....	1908	.....	Excellent.
1 cradle transmitter No. 2.....	1898	.....	Good.
Power plant:			
2 75-horsepower Rand drill duplex steam compressors, Nos. 112-3, 114-5.....	1898 (?)	6,000	Do.
1 Laidlaw Dunn Gordon duplex steam compressor, No. 116-7.....	1908 (?)	6,000 (?)	Do.
2 gauge boards.....	{ 1898 1908	.....	Excellent. Do.
1 air receiver.....	1898	.....	Do.
<i>New York general post office—</i>			
Terminals:			
5 sluice-gate open receivers, Nos. 13, 15, 17, 19, 21— 3.....	1898	.....	Fair.
2.....	1908	.....	Good.
3 cradle transmitters, Nos. 12, 14, 16.....	1898	800 (?)	Fair.
2 gravity transmitters, Nos. 18, 20.....	1908	720 (?)	Good.
Power plant:			
2 75-horsepower Rand drill duplex steam compressors, Nos. 101-2, 107-8.....	1898	6,000 (?)	Do.
1 100-horsepower Ingersoll duplex steam compressor, No. 105-6.....	1898	6,500 (?)	Do.
3 sets direct-connected Connorsville motor blowers, Nos. 109, 110— 2.....	1908	{ 3,200 (?)	{ Do. Excellent.
1.....	1912		
1 set direct-connected Laidlaw duplex motor compressor, No. 111..	1908	5,200 (?)	Good.
4 panel boards.....	1908	.....	Excellent.
4 air receivers.....	1898	.....	Good.
1 Sprague 6-horsepower exhaust vent fan.....	1908	250	Excellent.
<i>Station P.</i>			
Terminals:			
1 sluice-gate closed receiver, No. 9.....	1906	950 (?)	Excellent.
1 gravity transmitter, No. 8.....	1906	.....	Do.
<i>Wall Street Station.</i>			
Terminals:			
1 wheel machine, i. e., selective combination receiver and trans- mitter, No. 1.....	1906	.....	Good.
<i>Hudson Terminal Station.</i>			
Terminals:			
1 sluice-gate closed receiver, No. 1.....	1908	.....	Good.
1 gravity transmitter, No. 420.....	1908	.....	Do.

¹ Each.

List of equipment, Feb. 5, 1913, New York Pneumatic Service Co.—Continued.

	Year in- stalled.	Cost.	Condition.
<i>Station V.</i>			
Terminals:			
1 revolving-valve closed receiver, No. 94.....	1911	.....	Excellent.
1 gravity transmitter, No. 92.....	1911	.....	Do.
<i>Station A.</i>			
Terminals:			
2 revolving-valve closed receivers, Nos. 89, 91.....	{ 1908 ¹ 1911	}.....	Excellent.
2 gravity transmitters, Nos. 88, 90.....	1908	.....	Do.
Motor-driven time lock, No. 322.....	1912	.....	Do.
<i>Station O.</i>			
Terminals:			
3 revolving-valve open receivers, Nos. 81, 83, 85.....	1908	² \$1,713 (?)	Excellent.
3 gravity transmitters, Nos. 80, 82, 84.....	1908	² 720 (?)	Do.
1 motor time lock, No. 321.....	1908	200 (?)	Do.
Power plant:			
3 direct-connected Connorsville motor blowers, Nos. 124, 125, 126....	{ 1-1908 2-1910	.....	Do.
1 direct-connected Laidlaw duplex motor compressor, No. 127.....	1908	.....	Do.
3 Standard panel boards.....	1908	.....	Do.
1 combination automatic remote control panel board.....	1910	.....	Do.
3 air receivers.....	1908-1910	.....	Do.
<i>Station C.</i>			
Terminals:			
1 sluice-gate closed receiver, No. 87.....	1909	.....	Excellent.
1 gravity transmitter, No. 86.....	1909	.....	Do.
<i>Station E.</i>			
Terminals:			
2 sluice-gate closed receivers, Nos. 77, 79.....	1908	.....	Good.
2 gravity transmitters, Nos. 76, 78.....	1908	.....	Do.
1 dashpot control.....	1908	.....	Fair.
<i>Times Square Station.</i>			
Terminals:			
3 sluice-gate open receivers, Nos. 71, 73, 75:			
Two.....	1908	}.....	Excellent.
One.....	(³)		
3 gravity transmitters, Nos. 70, 72, 74—			
Two.....	1908	}.....	Do.
One.....	(³)		
2 motor time locks, No. 317.....		.....	Do.
Power plant:			
2 direct-connected Connorsville motor blowers, Nos. 139, 140.....	1909	.....	Do.
2 direct-connected Laidlaw duplex motor compressors, Nos. 141, 142.	1909	.....	Do.
3 standard panel boards.....	1909	.....	Do.
1 combination automatic remote control panel board.....	1909	.....	Do.
2 air receivers.....	1909	.....	Do.
Terrazo floor in engine room.....	1909	.....	Do.
<i>Station G.</i>			
Terminals:			
2 sluice-gate closed receivers, Nos. 67, 69.....	1908	.....	Good.
2 gravity transmitters, Nos. 66, 68.....	1908	.....	Do.
1 electric time lock.....	1908	.....	Do.
<i>Station G, operating office.</i>			
1 roll-top desk.....		40	Good.
1 typewriter desk.....		40	Do.
1 flat-top desk.....		30	Do.
1 drawing case.....		40	Do.
Filing cabinets, chairs, etc.....		150	Do.
Typewriting machine, adding machine, etc.....		250	Do.
<i>Station N.</i>			
Terminals:			
1 sluice-gate closed receiver, No. 65.....	1908	.....	Excellent.
1 gravity transmitter, No. 64.....	1908	.....	Do.
<i>Station W.</i>			
Terminals:			
2 sluice-gate open receivers, Nos. 61, 63.....	1908	.....	Excellent.
2 gravity transmitters, Nos. 60, 62.....	1908	.....	Do.
Power plant:			
1 direct-connected Connorsville motor blower, No. 129.....	1908	.....	Good.
2 direct-connected Laidlaw duplex motor compressors, Nos. 128, 130.	1908	.....	Excellent.
3 panel boards.....	1908	.....	Good.
1 air receiver.....	1908	.....	Do.
1 time lock.....	1908	.....	Do.

¹ Repaired.² Each.³ Since 1908.

List of equipment, Feb. 5, 1913, New York Pneumatic Service Co.—Continued.

	Year in- stalled.	Cost.	Condition.
<i>Station H.</i>			
Terminals:			
2 sluice-gate closed receivers, Nos. 57, 59.....	1909	.....	Fair.
2 gravity transmitters, Nos. 56, 58.....	1909	.....	Do.
<i>Station I.</i>			
Terminals:			
2 revolving-valve closed receivers, Nos. 95, 97.....	1912	.....	Excellent.
2 gravity transmitters, Nos. 94, 96.....	1912	.....	Do.
<i>Station J.</i>			
Terminals:			
2 sluice-gate open receivers, Nos. 53, 55.....	1908	.....	Excellent.
2 gravity transmitters, Nos. 52, 54.....	1908	.....	Do.
1 motor time lock.....	1908	.....	Do.
Power plant:			
2 direct-connected Connersville motor blowers, Nos. 131, 132.....	1908	.....	Good.
1 direct-connected Laidlaw duplex motor compressor, No. 133.....	1908	.....	Do.
2 standard panel boards.....	1908	.....	Excellent
1 combination automatic remote control panel board.....	1908	.....	Do.
2 air receivers.....	1908	.....	Do.
<i>Station L.</i>			
Terminals:			
1 sluice-gate open receiver, No. 49.....	1910-11	.....	Excellent.
1 sluice-gate closed receiver, No. 51.....	1908	.....	Good.
2 gravity transmitters, Nos. 48, 50.....	1908-1911	.....	Excellent.
Power plant:			
2 direct-connected Connersville motor blowers, Nos. 134, 135.....	1910-11	.....	Do.
2 combination automatic remote control panel boards.....	1910-11	.....	Do.
1 auxiliary motor compressor set, No. 148.....	1911	\$400	Do.
2 air receivers.....	1911	.....	Do.
1 auxiliary air receiver, No. 337.....	1911	100	Do.
<i>Station U.</i>			
Terminals:			
2 sluice-gate closed receivers, Nos. 45, 47.....	1908	.....	Excellent.
2 gravity transmitters, Nos. 44, 46.....	1908	.....	Do.
<i>Station K.</i>			
Terminals:			
2 sluice-gate open receivers, Nos. 41, 43.....	1910	.....	Excellent.
2 gravity transmitters, No. 240, 42.....	1910	.....	Do.
Power plant:			
2 direct-connected Connersville motor blowers, Nos. 136, 137:			
One.....	1908	.....	Do.
One.....	1910	.....	Do.
1 direct-connected Rand duplex motor compressor, No. 138.....	1910	.....	Do.
1 Standard panel board.....	1910	.....	Do.
2 combination automatic remote control panel boards.....	1908	.....	Do.
2 air receivers and 1 auxiliary tank.....	1908	.....	Do.
1 auxiliary motor compressor set, No. 147.....	1910-11	.....	Do.
1 36-inch 2-horsepower exhaust fan.....	1908	.....	Good.
<i>Station Y.</i>			
Terminals:			
2 sluice-gate closed receivers, Nos. 37, 39.....	1910	.....	Excellent.
2 gravity transmitters, Nos. 36, 38.....	1910	.....	Do.
<i>Grand Central Station.</i>			
Terminals:			
3 sluice-gate open receivers, Nos. 31, 33, 35—			
Two.....	1908	.....	Fair.
One.....	1910	.....	Good.
3 gravity transmitters, Nos. 30, 32, 34—			
Two.....	1908	.....	Fair.
One.....	1910	.....	Good.
1 motor time lock.....	1912	.....	Excellent.
Power plant:			
3 direct-connected Connersville motor blowers, Nos. 143, 144, 145—			
Two.....	1908	.....	Fair.
One.....	1910	.....	Good.
1 direct-connected Laidlaw motor compressor.....	1908	.....	Excellent.
2 Standard panel boards.....	1908	.....	Do.
2 combination automatic remote control panel boards.....	1908	.....	Do.
2 air receivers.....	1909	.....	Good.
1 carrier lift.....	1908	.....	Do.
<i>Station F.</i>			
Terminals:			
1 revolving-valve closed receiver.....	1911	.....	Excellent.
1 gravity transmitter.....	1911	.....	Do.

List of equipment, Feb. 5, 1913, New York Pneumatic Service Co.—Continued.

	Year in- stalled.	Cost.	Condition.
<i>Madison Square Station.</i>			
Terminals:			
2 revolving-valve open receivers, Nos. 25, 27	1911	.....	Excellent.
2 gravity transmitters, Nos. 24, 26.....	1911	.....	Do.
1 motor time lock, No. 312.....	1912	.....	New.
Power plant:			
2 Philadelphia Corliss duplex compressors, Nos. 118-9, 120-1.....	1898	.....	Good.
1 Rand duplex compressor, No. 122-3.....	1908	.....	Excellent.
2 air receivers.....	1898	.....	Good.
<i>Station D.</i>			
Terminals:			
1 revolving-valve closed receiver, No. 23.....	1911	.....	Excellent.
1 gravity transmitter, No. 22	1911	.....	Do.

NOTE.—Necessary air piping, steam piping, auxiliary piping, electric wiring, tools, lockers, accessories, etc., go with each station, and are generally in good condition.

Supplementary list, tubes, etc., Feb. 17, 1913, New York Pneumatic Service Co.

NOTE.—Where exact date of purchase or installation of mechanism or equipment is unknown, approximate date is stated as nearly as possible. Where cost was not ascertainable, column is left blank.

Tubes, etc.	Year installed.	Cost.	Condition.
Length of tubing in use, including Brooklyn, 54.2820 miles.			
NOTE.—Government is paying for use of only 54.2378 miles.			
The difference between “paid” and “used” mileage is as follows:			
1. 0.0121 mile added in alterations in Chambers and Pearl Streets for which an official order has not been given.			
2. 0.0092 mile in the Brooklyn Station L line, payment on which is limited by contract to a maximum of 1.35 miles, while actual distance is 1.3592 miles.			
3. Increase in line at Station V due to moving machinery 0.0008 mile; total 0.0221 mile.			
Street vaults, 112.....	Most of them 1908-1910.....		Excellent.
Standpipes, 58.....	1898.....		Fair.
Sets of bends, 1,945.....			
Closures, 1,335.....			
Number of carriers, 1,500 per set; total, 3,000.....			About one-third new, one-third fair, and the balance excellent.

NOTE.—Average age of all carriers: 8 months.

EXHIBIT C, N. Y. & B. NO. 2.

Pneumatic-tube stoppages during 1912.—Route 507011, New York, N. Y.

Date.	Stations.	Duration.	Cause.
Jan. 6	General post office, Wall Street, and P.	4.25 a. m. to 5.15 a. m.; 7.10 p. m. to 8 p. m.	Part of machinery becoming disarranged at Wall Street Station.
8	V and A.....	6.30 p. m. to 7 p. m.....	Carrier lodged in receiving apparatus at Station V.
8	O and C.....	10.45 p. m. to 11 p. m.....	Carrier hitting gate of receiver at Station C.
12	General post office, Wall Street and P.	6.20 to 6.52 a. m.....	Improper operating of machinery at the Wall Street Station.
17-21	J and H.....	7.55 p. m. to 8.20 p. m., Jan. 17; 10.55 p. m., Jan. 17, to 11 a. m., Jan. 21.	Formation of ice in tubes, necessitating excavation in street.

Pneumatic-tube stoppages during 1912.—Route 507011, New York, N. Y.—Continued.

Date.	Stations.	Duration.	Cause.
Feb. 4	General post office, Wall Street, and P.	7.25 a. m. to 8.08 a. m.	Carrier sticking in the operating machinery at the Wall Street Station.
7	General post office, New York, N. Y., and Brooklyn, N. Y.	5 p. m. to 5.41 p. m.	Transmitter breaking at the general post office, New York.
9	H and J.	2.30 p. m. to 5.35 p. m.	Formation of ice in line, necessitating excavation in street and building fire over tube.
11-13	Times Square, G, and W.	10.27 p. m., Feb. 11, to 1.20 p. m., Feb. 13.	Formation of ice in tube in Sixty-second Street and Amsterdam Avenue, necessitating excavation and building fire over tube.
14	.....do.....	11 a. m. to 2.30 p. m.	Ice forming in tubes in Sixty-second Street and Amsterdam Avenue.
28	General post office, P, and Wall Street.	7 p. m. to 7.35 p. m.	Carrier sticking in line between Station P and the general post office.
Mar. 12	Madison Square, D, and general post office.	6.10 a. m. to 4.15 p. m.	Carrier sticking in line.
21	General post office, P, and Wall Street.	7.18 a. m. to 8.18 a. m.	Carrier sticking in wheel machine at Wall Street Station.
21	.....do.....	11.25 a. m. to 11.50 a. m.	Machinery at Station P becoming disarranged.
23	General post office, V, and A..	3.15 p. m. to 3.50 p. m.	Carrier sticking in line.
25	General post office and H. T..	7.55 p. m. to 8.18 p. m.	Do.
Apr. 5	General post office, P, and and Wall Street.	8 p. m. to 8.45 p. m.	Carrier becoming wedged in the tubes at the Wall Street Station.
20	K and Y.	9.55 a. m. to 10.20 a. m.	Carrier lodging in receiving apparatus at Station Y.
24	O and E.	10.30 a. m. to 11 a. m.	Carrier sticking in line.
29	.....do.....	1.30 p. m. to 2.30 p. m.	Carrier riding on small piece of steel and blocking line.
May 7	General post office, V, and A.	5 a. m. to 5.25 a. m.	Carrier wedging in transmitter.
14	Grand Central and Y.	4.50 p. m. to 5.05 p. m.	Carrier sticking in receiving apparatus at Station Y.
16	General post office and Madison Square.	5.15 a. m. to 5.50 a. m.	Piece of steel wedging under packing ring of carrier, thus blocking line.
17	E and Times Square.	6.30 a. m. to 6.42 a. m.	Carrier sticking in line.
18	General post office, Wall Street, and P.	2.32 p. m. to 3.27 p. m.	Faulty operation of wheel machinery at the Wall Street Station.
22	General post office and Hudson Terminal.	7.45 p. m. to 7.52 p. m.	Carrier sticking in line.
27	Times Square and E.	3.40 p. m. to 3.58 p. m.	Disarrangement of receiving apparatus at Station E.
June 4	A and O.	7.30 a. m. to 8.10 a. m.	Carrier striking receiving gate at Station A.
7	Grand Central and F.	4 a. m. to 4.25 a. m.	Transmitter at Grand Central Station getting out of order.
7	E and Times Square.	7.03 p. m. to 7.32 p. m.	Carrier hitting gate at Times Square Station and lodging there.
11	Madison Square and Grand Central.	8.12 a. m. to 8.32 a. m.	Carrier hitting gate of receiver at Grand Central Station.
19	Times Square and E.	10.45 p. m. to 11 p. m.	Carrier becoming damaged in transit between Times Square and E.
24	Madison Square and Grand Central.	2.25 p. m. to 2.35 p. m.	Carrier becoming caught in machinery at Grand Central Station.
26	General post office and Madison Square.	4.45 a. m. to 6.35 p. m.	Carelessness of contractor for public service commission, permitting tube to sag.
26	Y and Grand Central.	8.18 p. m. to 11 p. m.	Disarrangement of operating machinery at the Grand Central Station.
26	Madison Square and D.	2.05 p. m. to 2.20 p. m.	Broken pipe at Park Place and Pearl Street.
27	E and Times Square.	12.07 p. m. to 12.30 p. m.	Carrier sticking in line.
28	O and C.	4 p. m. to 4.44 p. m.	Carrier becoming damaged in line and dropping part of its cover mechanism.
July 5	Madison Square and Grand Central.	7.55 p. m. to 8.35 p. m.	Carrier caught in receiving gate at the Grand Central Station.
5	General post office, V, and A.	6 p. m. to 6.50 p. m.	Carrier sticking in receiving machine at Station A.
9	.....do.....	8.32 p. m. to 8.50 p. m.	Operating machinery at Station V becoming disarranged.

Pneumatic-tube stoppages during 1912.—Route 507011, New York, N. Y.—Continued.

Date.	Stations.	Duration.	Cause.
July 9	General post office, New York, N. Y., and Brooklyn, N. Y.	12 m. to 12.23 p. m.	Carrier sticking in line.
13	L and U	6 a. m. to 6.25 a. m.	Carriers in transit riding onto one another and blocking operation of receiving machinery at Station U.
19	General post office, Wall Street, and P.	7.55 p. m. to 8.25 p. m.; 9.25 p. m. to 10.10 p. m.	Carrier sticking in line.
20	K, U, and L	2.30 p. m. to 4 p. m.	Broken tube at One hundred and twenty-fourth Street and Lexington Avenue, caused by open cut of subway contractors.
26	Madison Square, D, and general post office.	8.10 p. m. to 9.35 p. m.	Packing ring of carrier breaking while in transit.
Aug. 1	Grand Central and Times Square.	8.42 p. m. to 9.05 p. m.	Break in machinery at Times Square Station.
1	V and A	9.50 p. m. to 10.20 p. m.	Carrier sticking in machinery at Station A.
7	General post office, Wall Street, and P.	3.45 p. m. to 4.15 p. m.	Carrier sticking in line.
7-8	Times Square and G	5.25 p. m., Aug. 7, to 12.45 p. m., Aug. 8.	Carrier opening in transit.
14	W, N, and G	11.15 a. m. to 12 m.	Carrier hitting gate of receiving machine at Station N.
27	General post office, Wall Street, and P.	3.30 p. m. to 4 p. m.	Carrier sticking in line.
28	do	6.45 p. m. to 7.07 p. m.	Do.
29	do	5.15 p. m. to 5.42 p. m.; 6.52 p. m. to 7.20 p. m.	Do.
Sept. 2	General post office, V, and A ..	3.28 p. m. to 3.46 p. m.	Carrier spreading its packing ring between general post office and Station V.
3-4	General post office, Wall Street, and P.	12.30 p. m. Sept. 3, to 7 p. m., Sept. 4.	Broken joint in tube line in South William Street.
4	Grand Central, F, and Madison Square.	8.30 a. m. to 8.53 a. m.	Carrier hitting gate of machine at the Madison Square Station.
4	V and A	4 a. m. to 4.50 a. m.	Carrier lodged in receiving machine at Station A.
5	General post office, V, and A.	1.50 p. m. to 6.10 p. m.; 6.20 a. m. to 8.20 p. m.	Carrier sticking in line.
9	Times Square and E	7.15 p. m. to 7.30 p. m.	Carrier lodged in receiving machine at Station E.
13	General post office, V, and A ..	4.40 a. m. to 5.50 a. m.	Carrier sticking in line between general post office and Station V.
18	do	8.30 a. m. to 9.05 a. m.	Do.
19	do	4.35 p. m. to 4.50 p. m.; 5.05 p. m. to 5.50 p. m.	Carrier sticking in line.
20	Madison Square, D, and general post office.	6.15 a. m. to 6.30 a. m.	Careless treatment of pneumatic-tube line on open subway loop cut between Park and Pearl Streets and Chambers and Centre Streets.
21	Madison Square, D, and general post office.	4.35 p. m. to 4.55 p. m.	Careless treatment of line over public-service commission excavation at Centre and Duane Streets.
23	do	8.10 p. m. to 8.55 p. m.	Do.
24	do	2.35 p. m. to 3.45 p. m.	Do.
24	do	8.05 p. m. to 9.05 p. m.	Do.
25	do	6.50 p. m. to 7.10 p. m.	Do.
25	do	10.30 a. m. to 11.55 a. m.	Do.
25	A and general post office	4.55 a. m. to 5.25 a. m.	Carrier sticking in line.
26	General post office, Wall Street, and P.	1.25 p. m. to 1.45 p. m.	Do.
26	Madison Square, D, and general post office.	10.25 a. m. to 10.45 a. m.; 12.30 p. m. to 1 p. m.; 4.30 a. m. to 5.58 p. m.	Careless treatment of line over public-service commission excavation at Centre and Duane Streets.
27	General post office, V, and A ..	7.45 a. m. to 8.55 a. m.	Foreign matter finding its way into tube and stopping carrier.
30	do	9.10 a. m. to 10.30 a. m.	Carrier sticking in line.
Oet. 4	General post office and Hudson Terminal.	7.30 p. m. to 7.45 p. m.; 8.30 a. m. to 8.40 a. m.	Broken pipe at general post office.
4	Madison Square, D, and general post office.	9.50 a. m. to 10.35 a. m.	Careless treatment of pneumatic-tube line over public-service commission excavation at Centre and Duane Streets.
5	D and general post office	1.28 p. m. to 1.58 p. m.; 10.24 p. m. to 10.34 p. m.	Do.

Pneumatic-tube stoppages during 1912.—Route 507011, New York, N. Y.—Continued.

Date.	Stations.	Duration.	Cause.
Oct. 12	A and O	8 a. m. to 8.20 a. m.	Carrier sticking in line.
26	E and Times Square	3.55 p. m. to 4.30 p. m.	Operating machinery at general post office becoming disarranged.
9	General post office, V, and A..	8.40 p. m. to 9.20 p. m.	Sticking of carrier in line.
10	Madison Square, D, and general post office.	12.21 p. m. to 12.46 p. m.	Do.
19	.....do.....	7.45 a. m. to 8.05 a. m.	Do.
Nov. 1	Grand Central and F	9.28 p. m. to 11 p. m.	Do.
3	Madison Square, D, and general post office.	7.30 a. m. to 7.45 a. m.	Repairs to line.
6	.....do.....	9.15 p. m. to 9.55 p. m.	Carrier sticking in line.
7	.....do.....	8.50 p. m. to 10.35 p. m.	Do.
7	Times Square and G; also between Stations G, N, and W.	5.40 a. m. to 6.10 a. m.; 5.40 a. m. to 6.35 a. m.	Carrier damaging part of operating mechanism.
8	Madison Square, D, and general post office.	4.26 a. m. to 4.48 a. m.	Carrier sticking in line.
12	.....do.....	4.29 a. m. to 5 a. m.; 6.53 a. m. to 8.20 a. m.	Do.
13	.....do.....	9.12 a. m. to 9.55 a. m.	Do.
22	General post office, New York, N. Y., and Brooklyn, N. Y.	4 a. m. to 5.55 a. m.	Alterations to line running across Brooklyn Bridge.
23	O and C	4.10 a. m. to 7.55 a. m.; 9.45 a. m. to 10 a. m.	Foreign matter finding its way into tube and blocking carrier.
23	K and Y	1 p. m. to 1.28 p. m.	Carrier striking receiving gate at Station Y and damaging it.
Dec. 7	Times Square and G; also Stations G, N, and W.	5.40 a. m. to 6.10 a. m.; 5.40 a. m. to 6.35 a. m.	Carrier sticking in line.
23	Times Square and E	11.50 a. m. to 12.10 p. m.	Do.

EXHIBIT C, N. Y. & B. NO. 3.

POST OFFICE, BROOKLYN, N. Y.,
EXECUTIVE DIVISION,
OFFICE OF THE POSTMASTER,
February 14, 1913.

MR. ALFRED BROOKS FRY,
Supervising Chief Engineer, United States Public Buildings, New York, N. Y.

SIR: With respect to your call at this office on the 13th instant, relative to the pneumatic-tube system installed in this office, I have to respectfully report that the pneumatic tube has not had any stoppages for any cause whatsoever during the past six months.

Complaints have been made to the company relative to low pressure on the pneumatic tube and the company have responded by increasing the air pressure accordingly.

The stoppages on the pneumatic-tube service average about two a year and they are of short duration.

At the present time there is no complaint whatsoever regarding the pneumatic-tube service.

Respectfully,

E. W. VOORHIES,
Postmaster.

EXHIBIT D, N. Y. & B. NO. 4.

On Sunday morning, February 16, 1913, previous arrangements having been made and excavation performed, there were taken out, under direction of the chief engineer of the New York Pneumatic Service Co., two lengths of 8-inch pneumatic tube and also one cast-iron bend, No. 222, from a location on Washington Street immediately opposite the westerly extension of the Brooklyn post office, the tube parts removed forming part of the line between the general post office, New York, and the general post office, Brooklyn, said line running via Brooklyn Bridge.

The bend named is reported to have been installed in 1907. The straight lengths taken out are reported to have been installed, and I believe were installed, as part of the original line between the said general post offices, which was put in service in 1898.

The ground in location where tubes were dug out consists chiefly of sand mixed with some loam, clay, and gravel; above the tubes it was generally rather porous. The depth from base of pavement to the top of the tubes was about 4 feet 6 inches.

The pavement in this place consists of worn Belgian blocks laid in sand and gravel and without any other foundation.

Internally the bend taken out showed wear on the outer side of the curve amounting to 0.0312 inch. The straight portions of the tube showed in some places an observable rather than a measurable wear, the maximum variation between horizontal and vertical dimensions being 0.007 inch.

The bend was almost altogether unrusted on the outside and was not pitted or corroded; in fact, most of the original black coating on the cast iron still remained.

On the straight lengths the black coating remained visible on a portion of the long length. Other portions of the long length and much of the short length were more or less covered with scale consisting, apparently, of oxide of iron and clay, though the body of the pipes was not badly corroded.

Drilling said pipes where the pitting or rust seems to have been the greatest indicates a minimum thickness of 0.415 inch, against what was probably the original thickness of 0.5625 inch.

On the bottom of the west length of pipe removed, and toward its westerly end, there was little or no rusting, some of the black surfacing still remaining in place, notably on the bottom; but there was considerable pitting, indicating electrolytic action.

A double trolley track passes parallel to these tubes and is laid with the nearest rail, say, from $4\frac{1}{2}$ to 5 feet away from the nearest point of pipe.

Over that portion of the tube where the electrolytic action appears to have occurred there runs at right angles a lead-covered conductor to an arc street light and an iron conduit, containing electric conductors, running into a dry-goods shop opposite the Brooklyn post office; and since here the Belgian-block pavement is considerably worn, is laid without any concrete or other waterproof foundation, and on soil rather pervious it is entirely possible that in continued wet weather there may have been, and may be, more or less passage of stray currents between these cast-iron tubes and the trolley tracks, or between said tubes, the lead-protected conductor to the arc lamp, or electric lighting mains incased in the iron conduit heretofore described.

Of course, if there was any passage of stray current between the pneumatic-tube lines and the electric conduits heretofore named, the source would seem to be largely through induction, since there could not be anything approaching a serious ground in the said electric conductors to the arc lamp or to the dry-goods shop without causing noticeable trouble.

It is quite probable that unless we have pneumatic mail tubes laid in some permanently wet location, or where there is a possibility of deterioration from chemicals, or severe electrolytic action, these samples taken out in this Brooklyn line may be fairly regarded as typical of their age.

Owing to the pervious character of the pavement and of the soil, in wet or rainy weather there is undoubtedly considerable free ammonia from horse droppings and alings washed down through the earth and around these tubes, but in most cities this condition would be rather abnormal, because nowadays there is usually laid impervious pavements.

My opinion in this respect seems to be borne out by the conditions found in tube sections removed from the Station P line, New York, and examined the same afternoon, description of which follows:

On the afternoon of Sunday, February 16, 1913, the necessary previous arrangements having been made and excavation performed, there was taken out, under the direction of the chief engineer of the New York Pneumatic Service Co., one long length, one short length, and one section of a bend, in South William Street, near the junction of William Street, from the postal Station P line, which originally ran between the Produce Exchange and the New York general post office and was subsequently extended from the Produce Exchange to said Station P when said station was removed from the Produce Exchange to the customhouse, New York.

The bend referred to was installed in 1907. The long and the short section of piping were installed in 1897-98 and formed part of the original Station P line.

As regards internal condition, the bend showed slight wear on the outer side of the curve, said wear, judging by portions of the bend where there seemed to have been no bearing, amounting to, say, 0.03 inch. In straight tubes evidences of wear appeared slight. Externally, both lengths of pipe removed seemed in considerably better condition than the lengths taken out from the front of the Brooklyn post office. There was little rust or scale. There was no marked corrosion and no evidences of electrolytic action.

These pipes are buried about 3 feet 6 inches from the top of the pipe to the lower concrete base beneath the pavement, which in this location is asphalt. The soil is sand, mixed with cellar dirt and fill, and the location rather damp. The tubes pass

through the side of a sewer brick manhole, but not near any electric conduit or any other piping. The soil in which tubes in this location were laid is more or less impervious to rainfall or melting snow, from the fact that in said location the said soil above tubes has over it some remaining portions of a concrete foundation that probably was under the original Belgian block pavement on South William Street, and this concrete foundation has again over it a concrete bed from 4 to 5 inches thick, on which there is from 2 to 3 inches of asphalt.

Hence the noted somewhat damp condition of the soil is probably due to the low grade of this street as compared with high water, it being probably not over 8 feet above same.

I may sum up this memorandum on the sections of tube taken out by saying that probably the Brooklyn tube will stand continuous operation for a period of 15 years unless the supposed electrolytic action becomes more violent, and the Station P or South William Street tube would seem to be able to remain in service for 15 years more or upward unless some new factors are introduced with reference to external corrosion or internal wear. The question is practically that of external corrosion, not internal wear, which, particularly in the straight portions, is almost negligible after, say, 14 years' service.

EXHIBIT E, N. Y. & B. NO. 5.

NEW YORK CITY, February 24, 1913.

A. B. FRY,
Supervising Chief Engineer, United States Public Buildings, New York City.

SIR: In accordance with your instructions I have examined all power plants, shop and office equipments, tools, etc., property of the New York Pneumatic Service Co., and submit herewith report, including schedules of machinery, etc.

The power-plant apparatus has been kept in first-class repair and is generally in good condition; the small parts of valve gears of steam-driven compressors show wear and some lost motion, but renewal of these parts can be made at small expense, after which the machines will be practically as good as new.

Likewise the gears on the older Connorsville blowers are partially worn but good for much future service.

All of the steam and motor driven compressors are of much larger capacity than the daily load demands, due to the reserve capacity necessary in case of stoppage of a carrier in transit through the tubes, which overcapacity provides large parts and wearing surfaces and prolongs the life of the apparatus.

The motors, wiring, control panels, switches, etc., are in excellent condition and by reason of their reserve capacity show very little effect of past service.

The receiving and transmitting machinery is not materially worn in the main parts, and the wear on small parts, such as trip devices, time dashpots, valves, etc., is not serious. It has been the practice of this company to renew these parts from time to time, thereby keeping the apparatus in a condition equal to new.

The air and steam piping, auxiliary piping, station wiring, tools, lockers, accessories, etc., are complete in each power station and in fair condition.

The following pieces of pipe removed from the New York & Brooklyn tube line were examined and measured with micrometer gauge for variations due to wear:

Location.	Date in-stalled.	Variation between horizontal and vertical diameters.
		Inches.
Full-length pipe from front Brooklyn post office.....	1898	0.006
Short-length pipe from in front Brooklyn post office (next to bend).....	1898	.007

The long piece was badly pitted on the exterior, undoubtedly due to electrolysis; the deepest pit was drilled and was found to have a depth of 0.16 inch below the surface. The solid metal between bottom of pit and interior bore of pipe measured 0.415 inch, which left ample metal for continuous use of this section for another period of 20 years. The pipe examined has an average thickness of 0.5625 inch and none of it was scored or showed ridges due to wear by carriers, but on the contrary had a smooth polish on the interior.

Sections removed recently from the New York tube lines were also examined, but no material wear or other depreciation which would injure its usefulness were found.

These tubes can be purchased at the price of \$2.50 per running foot, bored accurately to gauge.

A trip was made over the entire tube lines in place in New York and Brooklyn and some 52 manholes and 66 odd standpipes were examined.

All manholes are constructed of concrete and brick, capped with heavy cast-iron frames and covers, set flush with street grade, and were found in excellent condition as to construction and accessibility and closures or bends were found in practically every one, including also test pipes for determining the location of stoppages in lines when occurring.

The standpipes are brought up to within 8 to 12 inches of the surface of street, protected by brick inclosures and capped with heavy cast-iron frames and covers. These were all in good condition except the covers, which in many cases are worn or have broken corners, due to the heavy street traffic. These covers are worth about 75 cents apiece; hence the renewal cost is a minor item. The standpipes are found mostly below the numbered streets in New York and on the approaches at both sides of the Brooklyn Bridge.

It was not possible to check the number of closures and bends, as most of these are buried, inaccessible, and the correct number could only be found from the plans showing the details of the street lines.

Likewise the number of carriers could not be checked with any reasonable accuracy, as they are continually in transit. Several hundred new ones are in stock at the Grand Central plant and from 30 to 100 were seen at each sending and receiving station.

These carriers are said to last about 12 months and a fair average of life may be taken at 8 months; repair to the packings and latches prolongs life and usefulness and does not involve large expense in materials, labor, or equipment.

In conclusion it may be stated that the power machinery, tools, and engine rooms were found to be clean and well kept, and material depreciation by reason of daily wear has been largely offset by renewals and repairs from time to time.

Respectfully,

DAVID F. ATKINS.

EXHIBIT F, N. Y. & B. NO. 6.

MEMORANDUM OF GENERAL EXPENSES IN THE DEVELOPMENT AND CONSTRUCTION OF THE PNEUMATIC MAIL TUBES. FEBRUARY 24, 1913.

The following is a memorandum of some of the more important expenses of the pneumatic-tube companies that were necessary in the development and construction of the mail-tube systems, but which are not included in the actual work of construction. They form no part of the cost of material and labor directly involved in the work, and may therefore be classified as general miscellaneous expenses. They do not include the usual "overhead" charges, such as salaries of officers, office expenses, etc. They make up the difference between the cost of the tube systems represented in material and labor and their cost as it appears on the books of the company:

DEVELOPMENT AND EXPERIMENTS.

In the 20 years that have elapsed since the first mail tube was laid in Philadelphia, large sums of money have been expended in experiments and development covering such features as tubes, bends, transmitters, time locks, receivers, compressors, carriers, and numerous minor details. It is within the past five years that what may be termed standard types of apparatus have been adopted. Improvements will, of course, continue to be made so long as tubes are used, but probably they will be of minor importance.

Some of the development is included in the construction cost of the later lines, but a large part of it comes under the head of general miscellaneous expense. To give several specific examples: An experimental air compressor was constructed and tested at a cost of several thousand dollars, with the result that it was relegated to the scrap pile. A demonstration line of tubes was constructed in Chicago and another at Lowell, Mass., each at a cost of thousands of dollars; they served a useful purpose and were then consigned to the scrap pile, so do not appear to-day as a part of the mail-tube systems. Only recently nearly \$15,000 has been expended on a demonstration

plant in Cambridge, Mass., to show the practicability of a 30-inch tube operated electrically. A great many forms of carriers have been made and tested, with knowledge and experience as the sole compensation. The item of foundry patterns that have become obsolete would be surprisingly large if it were known. Antiquated styles of tube fittings have been carried for years in the stock of store yards, to be finally disposed of to the junk dealer.

While there has been great development in the years gone by, the pneumatic-tube system is no longer in the "experimental stage." The tubes and apparatus have been standardized. Their efficiency and durability are indicated by the few interruptions in the service and the approach of the operating expense curve to horizontal.

FRANCHISES.

The securing of franchises in each of the cities where pneumatic tubes have been laid has involved considerable expense which does not appear under this heading on the books of the company. Therefore the exact amount can not be stated. It necessarily includes lawyers' fees and expenses.

The franchise under which tube lines were laid in New York City was secured by purchasing a controlling interest in the New York Mail & Newspaper Transportation Co., which company owned a charter granted by the State of New York. Control of this company was obtained by a payment of cash and an exchange of its securities for the securities of the American Pneumatic Service Co. The New York Mail & Newspaper Transportation Co. had, besides its charter, a valuable asset in its pneumatic-tube line extending from the general post office in New York to the general post office in Brooklyn, so that it is impossible to say what part of the purchase price should be credited to its charter that included franchise rights to lay tubes in the streets of cities within the State.

Franchise rights in the city of Boston came to the American Pneumatic Service Co. through its purchase or control of two subsidiary companies, so that again it is impossible to determine the exact cost of the franchise by an examination of its books, but it is safe to say that the cost was real and considerable. In Chicago a cash payment of \$50,000 was made to the city.

Whether or not these franchises have any real value to the Government in case of Government ownership of the tubes, the fact remains that they did cost the American Pneumatic Service Co. a considerable sum in either cash or securities that stand as a liability until redeemed.

LEGAL EXPENSE.

All corporations doing business at the present day require more or less legal advice and legal services in the drawing of numerous papers that are required in the conduct of their business. Therefore the item of legal expense becomes a considerable one in the total expense of the company. It is an expense that varies, but can not be entirely avoided, and is as necessary as any other expense which the companies have to incur. From time to time the companies have been obliged to defend themselves in court, and this necessitates unusual legal expense. These expenses come under the head of "General miscellaneous expense."

PATENTS.

During the development of the system, as already pointed out, many new devices have been designed which have been made the subject of United States patents. The American Pneumatic Service Co. at present owns 137 patents. Through two of its subsidiary companies it owns 7 additional. It holds a license to use 33 patents of the Batcheller Pneumatic Tube Co., 20 patents of the Pearsall Pneumatic Tube & Power Co., and 2 patents granted to Bemis.

It is impossible for anyone to say exactly what the obtaining of these patents has cost the American Co., but I will venture to estimate the cost of the 137 which it owns outright at a sum not less than \$50,000. The cost of the license to use the Batcheller and Pearsall patents was a considerable sum in cash and securities of the American Pneumatic Service Co.

The patent rights have materially aided in the development of the tube system, which justifies the expense. This is a part of the general miscellaneous expense of the system.

INTEREST.

In order to construct the tube systems in the various cities, capital has been raised by the sale of stocks, bonds, and other obligations. During the construction of tube lines, and up to the time sufficient income is received from their operation, the com-

pany must pay the interest on the bonds and notes (or stock, if the same is guaranteed), which interest is properly charged to the cost of the tube system. This expense ceases when the income from the tube system exceeds the operating expenses by an amount equal to the fixed charges.

In the case of the New York Co., from November 1, 1906, to March 31, 1912, the amount of interest so charged to the cost of the system was \$193,242; in Boston it was \$72,150.56; in Chicago, \$50,093.77; and in St. Louis, \$38,472.24.

COST OF OBTAINING CAPITAL.

The cost of obtaining capital for any enterprise is in direct ratio to the amount of risk involved. The risk in the case of the pneumatic mail tubes has been very large, especially in the early days of its development. Even under the present 10-year contract there is no assurance that the contract will be renewed at the end of the 10-year period, and if it is not, or the tubes are not taken over by the Government, practically the entire investment will be lost.

Under these circumstances a large commission, or what is equivalent to a commission, must be paid to the bankers to underwrite the securities, in case they are not purchased by the stockholders. In the case of the first preferred stock, this was offered to the stockholders at par, but only 5 per cent of the \$1,500,000 was disposed of in this way, showing it is impossible to sell the company's stock at its par value.

In some previous cases a share of preferred (\$50 par) and a share of common (\$50 par) were sold for \$50, but the company has obligated itself to the amount of \$100. Call this difference water, or whatever one pleases, it was the only terms upon which capital could be raised at that time. The \$1,500,000 first preferred 7 per cent stock of the American Pneumatic Service Co. was underwritten by bankers at 93. In this case the company paid 7 per cent, or a total sum of \$105,000, to obtain its capital for tube construction. In the early days an even higher price was paid. Since the capital stock is a liability, the cost of obtaining it is a part of the cost of the tube system.

ORGANIZATION EXPENSES.

Owing to the fact that franchises are only granted to local organizations, it has been necessary to organize local companies in each of the cities where the tube systems have been constructed. The organization of these companies involved more or less expense, which is a part of the cost of the systems.

In New York City, the first company organized, the Tubular Dispatch Co., went into bankruptcy; the second company, the New York Mail & Newspaper Transportation Co., defaulted on its Government contract, which necessitated the organization of a third company, the present New York Pneumatic Service Co. In Boston two local companies have by necessity been organized; in Chicago two; and in St. Louis one. In order to control all these companies by a single organization, the parent, or American Pneumatic Service Co., came into existence.

COST OF SECURING GOVERNMENT CONTRACTS.

This heading may sound a little anomalous, but it none the less represents a real expense. While the Government has finally come to realize the value of the pneumatic-tube service in the transportation of its mails, it by no means recognized that value from the beginning; and were it not for the confidence of the promoters of the enterprise in its ultimate success there would have been no systems of underground mail tubes to-day. In order to bring these systems into existence it was necessary for representatives of the companies to go to Washington and interview officials of the Post Office Department and Members of Congress to (first) secure the necessary appropriations and to (second) obtain the contracts for the transportation of the mails. These expenses were absolutely necessary, for if they had not been incurred there would have been no tube systems. Therefore they must be considered as a legitimate part of the expense of developing the enterprise.

DEFICIT DURING THE EARLY YEARS OF OPERATION.

During the first few years that the contracts with the Government were in force the revenue obtained from the tubes was not sufficient to pay the operating expenses. The companies were therefore obliged to supply this deficit by the issuing of notes for the amount of the deficit, which it is hoped will be paid in full in the future.

PNEUMATIC TRANSIT COMPANY.
PHILADELPHIA, PA.
FEB 1ST 1911

FEB. 15, 1911.
SCALE: 1 INCH = 2400 FT.

NOTE. — INDICATES TWO PNEUMATIC TUBES.

ABANDONED TUBE LINES.

The company has suffered a considerable loss by the compulsory abandonment of portions of its lines when the Government changed the location of post-office stations that had tube connections. The cost of moving the tube equipment from one location to another was charged against operating expense, but the lines and the original equipment of the stations had already been capitalized, so that their abandonment was a direct loss that must be added to the cost of the lines now in operation.

In Boston A and Back Bay stations were moved. In New York stations V, A, O, J, F, D, P, and Madison Square were each moved once and Grand Central twice. Station E is about to be moved to the new post office. In Chicago stations Armour and Twenty-second Street were moved, temporary post office and Wells Street were abandoned, tube line through La Salle Street Tunnel was destroyed, and Kinzie Station is soon to be moved to Chicago Avenue. In St. Louis Annex Station was moved to the new general post office.

I estimate roughly that these changes of location of post-office stations have cost the companies about \$193,342 by the abandonment of what was revenue-producing equipment, to say nothing of the expense incident to the change.

This is a much larger item than was anticipated by the companies, and probably by the Government, when the contracts were entered into. It properly comes under the head of general miscellaneous expense.

AMERICAN PNEUMATIC SERVICE CO.,
———, *Chief Engineer.*

EXHIBIT G, N. Y. & B. NO. 7.

AMERICAN PNEUMATIC SERVICE CO.,
Boston. March 1, 1913.

ALFRED BROOKS FRY,

Consulting Engineer, 727 Customhouse Building, New York City.

DEAR SIR: I acknowledge the receipt of your letter of February 28 in which you transmit an equipment list, dated February 5, 1913, of the New York Pneumatic Service Co., with the request that we, so far as possible, immediately fill in the cost column of this list and return it to you.

It is in most instances an impossibility to give you the actual cost of this equipment, first, because in many instances we made them, either in whole or in part, in our own shops and in odd lots, for which reason the manufacturing cost, transportation expenses, engineering, inspection, and overhead expenses are spread over groups of different pieces and not on individual pieces; and, secondly, because where we bought from manufacturers—as, for example, motors, panel boards, etc.—this equipment was bought in lots of five or six motors of different sizes, and five or six panel boards to go with the motors, the prices in no instance being separated.

We are very glad, however, to give you all the detailed information which we can obtain. We are, therefore, requesting Mr. Batcheller, our chief engineer, to fill in this list as far as possible from data which he has in New York, and from information which he can obtain in Boston.

Respectfully, yours,

WM. H. AMES,
President.

EXHIBIT I, PHILADELPHIA NO. 1.

INVENTORY OF PNEUMATIC TUBE LINES AND OTHER PROPERTY OWNED BY THE PNEUMATIC TRANSIT CO., FEBRUARY, 1913.

The pneumatic-tube lines of the Pneumatic Transit Co. are (February, 1913) as follows:

	Length.	Present condition.
	<i>Miles.</i>	
1. Double 6-inch line connecting the Bourse Building, Fourth and Chestnut Streets, with the central post office, Ninth and Chestnut Streets, 1893	0.560	Good.
2. Double 8-inch line connecting central post office with Broad Street Station. Fifteenth and Market Streets, 1898.....	.7267	Do.
3. Double 8-inch line connecting central post office with Reading Terminal, Twelfth and Market Streets, 1909.....	.2785	Do.
4. Double 8-inch line connecting central post office with Station S, Sixth and Fairmount Avenue, 1906.....	1.4110	Do.
5. Double 8-inch line connecting Station S with Station O, Tenth and Columbia Avenue, 1906.....	1.2100	Do.
6. Double 8-inch line connecting Station O with Fairhill Station, Lehigh Avenue and Hutchinson Street, 1910.....	1.1750	Do.
7. Double 8-inch line connecting Fairhill Station with North Philadelphia Station, Broad and Glenwood Avenue, 1910.....	.6230	Do.
8. Double 8-inch line connecting Broad Street Station with Station J, Nineteenth and North Streets, 1908.....	1.2457	Do.
9. Double 8-inch line connecting Station J with Station C, 1921 Oxford Street, 1908.....	.8825	Do.
10. Double 8-inch line connecting central post office with Station Southwark, Tenth and Washington Avenue, 1908.....	1.0155	Do.
11. Double 8-inch line connecting Southwark Station with Station D, Eighteenth and Christian Streets, 1908.....	.872	Do.
Total mileage.....	9.9999	

Laid with these tube lines there are the following conduit and manholes:

4-duct vitrified-clay conduit incased in 3-inch concrete casing.....miles.. 6.0
6-duct vitrified-clay conduit incased in 3-inch concrete casing.....do.... 2.5
177 manholes, 9-inch brick walls, concrete bottom, reenforced-concrete roof;
average size inside 4 feet 6 inches wide by 6 feet 6 inches deep.

Owing to the difficulty of financing the construction of these lines (due to the fact that the contracts were not of sufficient duration to assure the repayment of the principal) most of them were built for round sums in stock under contract.

The cost of the line Broad Street to Stations J to C is, however, accurately known to have been as follows:

Broad Street Station.....	\$20,141.89
Station J.....	24,680.93
Station C.....	14,947.96
Line.....	102,378.95
Equipment (carriers, etc.).....	2,200.00
Plans, inspection, and office expenses.....	8,787.48
Total.....	173,137.21

The length of this line is 2.1282 miles.

The cost of this line per mile is therefore \$81,350.

For the operation of these lines there is provided the following carrier equipment:

100 6-inch carriers.....	\$1,500
1,100 8-inch carriers.....	22,000

The figures given above do not include the commission paid to the Batcheller Pneumatic Tube Co. for overseeing the construction and assuming all responsibility for successful operation of the lines. This commission was usually 10 per cent.

The most important of the apparatus entering into the equipment of the stations is given in the following tables; but except in the case of Stations Broad Street, J, and C, these tables are incomplete and take no account of the labor involved in preparing the station and installing the apparatus. The stations named are the only ones for which fairly complete information is available.

	Cost.	Present condition.
CENTRAL POST OFFICE.		
4 8-inch gravity transmitters complete with automatic time locks, guards, air connections, etc., 1906-1909.	\$2,704.00	Good.
2 8-inch double-decked centrifugal receivers (equivalent to 4 receivers) complete with regulating apparatus and air connections:		
1906.....	1,372.00	} Do.
1908.....	1,372.00	
1 6-inch gravity transmitter with appurtenances, including patterns, 1912.....	550.00	Do.
1 6-inch single gate, receiver with appurtenances, including patterns, 1893, estimated.	750.00	Do.
1 gauge board equipped with 6 pressure gauges and alarm whistles, 1906, estimated..	75.00	Do.
2 steel racks for 8-inch carriers, 1906, estimated.....	100.00	Do.
3 Ingersoll-Rand duplex reciprocating air compressors, cylinders 21 inches by 12 inches stroke, speed about 125 revolutions per minute, with Corliss type valves, gear, automatic lubricators to every moving part, Morse silent chain drive, chain guards, etc, 1906.	6,930.00	Do.
3 Ingersoll-Rand duplex reciprocating air compressors, cylinders 21 inches by 10-inch stroke, speed about 160 revolutions per minute, with Corliss type valve gear, automatic lubricators, and provision for mounting motor armature directly upon driving shaft, 1908.	9,000.00	Do.
1 Westinghouse D. C. 220-volt, 50-horsepower, shunt-wound electric motor, 525 R. P. M., with driving pinion, 1906.	850.00	Do.
1 Westinghouse D. C. 220-volt, 40-horsepower, shunt-wound electric motor, 550 R. P. M., with driving pinion, 1906.	765.00	Do.
1 Westinghouse D. C. 220-volt, 30-horsepower, shunt-wound electric motor, 600 R. P. M., with driving pinion, 1906.	705.00	Do.
1 Westinghouse D. C. 220-volt, 16.62-horsepower, shunt-wound electric motor, 160 R. P. M., mounted directly upon driving shaft by compressor, 1908.	940.00	Do.
1 Westinghouse D. C. 220-volt, 28.48-horsepower, shunt-wound electric motor, 160 R. P. M., mounted directly upon driving shaft of compressor, 1908.	1,200.00	Do.
1 Westinghouse D. C. 220-volt, 23.17-horsepower, shunt-wound electric motor, 160 R. P. M., mounted directly upon driving shaft of compressor, 1908.	1,000.00	Do.
6 slate switchboard panels for above motors, each mounting ammeter, 2-pole circuit breaker, starting rheostat field regulator, pneumatic circuit breaker, 8-inch brass pressure gauge, etc., included.		
6 slate switchboard panels for above motors, each mounting circuit breakers, contactors, relays, etc., for remote control, 1912.	1,186.00	Do.
1 station voltmeter, 1906.....	42.00	Do.
Air piping between compressors and tube terminals, 1906-1910.....	4,190.00	Do.
Electric wiring, 1906-1910.....	1,077.00	Do.
Compressor foundation, air reservoirs, pipe trenches and covers, compressor room (ventilating, etc.), installing the apparatus, etc., estimated (see plans Nos. 961, 963, 1081, and 1082).	18,796.32	
Total cost of central post office, including Batcheller commission	53,604.32	
STATION S.		
2 8-inch gravity transmitters with time locks and appurtenances, 1906.....	1,352.00	Good.
1 8-inch double-decked centrifugal receiver (equivalent to 2 receivers) with appurtenances, 1906.....	1,372.00	Do.
1 gauge board with 2 pressure gauges and alarm whistles, 1906, estimated.....	40.00	Do.
1 steel carrier rack, 1906.....	50.00	Do.
3 Ingersoll-Rand duplex reciprocating compressors, cylinders 21 inches by 12 inches stroke, speed about 125 R. P. M., Corliss type valve gear, with automatic lubricator, Morse silent chain drive, chain guards, etc., 1906.	6,930.00	Do.
2 Westinghouse 220-volt, 2-phase, 60-cycle induction motors, 40-horsepower, 690 R. P. M., with driving pinion, 1906.	1,220.00	Do.
1 Westinghouse 220-volt, 2-phase, 60-cycle, induction motor, 50-horsepower, 685 R. P. M., with driving pinion, 1906.	675.00	Do.
3 slate switchboard panels for above motors, equipped with ammeter, 4-pole circuit breakers, etc., included.		
3 slate panels for above motors equipped with circuit breakers, contactors, and relays for remote control, 1912.	732.00	Do.
3 hand starters included.		
3 slate panels mounting change over switches.		
1 station voltmeter, 1906.....	42.00	Do.
Air piping, 1906.....	1,703.00	Do.
Wiring, 1906.....	443.00	Do.
Compressor foundations, pipe trenches, and covers, air reservoir, and installing apparatus, etc., exclusive of preparing station, estimated (see plans Nos. 931 and 964).	7,861.86	
Total cost of Station S, including Batcheller commission	22,420.86	

	Cost.	Present condition.
STATION O.		
2 8-inch gravity transmitters, complete, with appurtenances:		
1906.....	\$676.00	Good.
1910.....	520.00	Do.
1 8-inch double-decked centrifugal receiver, complete, with appurtenances, 1906....	1,372.00	Do.
1 gauge board with 2 pressure gauges and alarm whistles, 1906.....	40.00	Do.
1 steel carrier rack, 1906.....	50.00	Do.
2 Ingersoll-Rand duplex air compressors, cylinders 21 inches by 12-inch stroke, Corliss type valve gear, speed about 125 R. P. M., with automatic lubricators, Morse chain drive, chain guard, etc., 1906.	4,620.00	Do.
1 Connersville special positive pressure Root type blower, 5.75 cubic feet per revolution, speed about 226 R. P. M., with Reynolds silent chain drive inclosed in guard and running in oil, etc., 1910.	1,491.00	Do.
1 Westinghouse 220-volt, 2-phase, 60-cycle induction motor, 40 horsepower, 690 R. P. M., with driving pinion, 1906.	610.00	Do.
1 Westinghouse 50-horsepower induction motor, 685 R. P. M., similar to preceding, 1906.	675.00	Do.
1 General Electric 35-horsepower induction motor, 690 R.P. M., with driving pinion and outboard bearing, 1910.	575.00	Do.
3 slate panels, mounting ammeters, 4-pole circuit breakers, etc., included.		
3 slate panels, mounting 2-pole circuit breakers, contactors, relays, etc., for remote control, 1912.	770.00	Do.
3 slate panels, mounting change over switches, 3 hand starters included.....		
1 station voltmeter, 1906.....	42.00	Do.
Air piping, 1906-1910.....	2,123.00	Do.
Electric wiring, 1906-1910.....	361.00	Do.
Compressor foundations, pipe trenches and covers, and the installing of apparatus, etc., exclusive of preparing station, estimated (see plans Nos. 1210 and 1211).	7,519.00	
Total cost of Station O, including Batcheller commission	21,444.00	
STATION FAIRHILL.		
2 8-inch gravity transmitters complete as described, 1910.....	1,040.00	Good.
1 8-inch double-decked centrifugal receiver (equivalent to 2 receivers) complete as described, 1910.	1,372.00	Do.
1 gauge board mounting 2 pressure guages and valve whistles, 1910.....	40.00	Do.
1 steel carrier rack, 1910.....	50.00	Do.
2 Connersville special positive pressure Root type blowers, 5.75 cubic feet per revolution, speed about 226 R. P. M., with Reynolds silent chain drive inclosed in guard and running in oil, 1910.	3,041.00	Do.
1 Connersville blower as above but of a displacement of 4.3 cubic feet per revolution and speed of 300 R. P. M., 1910.	1,272.00	Do.
1 General Electric 220-volt, 2-phase, 60-cycle induction motor, 50 horsepower, 690 R. P. M., with driving pinion and out-board bearing, 1910.	643.00	Do.
1 General Electric motor similar to the preceeding but of 35 horsepower, 1910.....	575.00	Do.
1 General Electric motor similar to the preceeding but of 25 horsepower, 1910.....	530.00	Do.
3 slate panels mounting ammeter, 4-pole circuit, oil-circuit breaker, with automatic overload and no voltage release, included.		
3 slate panels mounting 2-pole circuit breakers, contactors and relay for remote control, 1912.	770.00	Do.
3 hand starters, included.....		
2 panels mounting throw-over switches.....		
1 station voltmeter, included.....		
Compressor foundations, pipe trenches and covers, air reservoir, and installing apparatus, etc., exclusive of preparing station estimated (see plans Nos. 1207-1208-1288).	5,039.82	
Total cost of Fairhill Station (including Batcheller commission)	14,372.82	
STATION, NORTH PHILADELPHIA.		
1 8-inch swinging cradle transmitter with time lock and appurtenances, 1910.....	1,040.00	Good.
1 8-inch centrifugal receiver, 1910.....	686.00	Do.
1 gauge board mounting one gauge, 1910, estimated.....	30.00	Do.
1 steel carrier rack, 1910.....	50.00	Do.
1 Connersville special positive pressure Root type blower 5.75 cubic feet per revolution, speed about 226 R. P. M., Reynold silent chain drive inclosed in guard, running in oil, 1910.	1,550.00	Do.
1 Connersville blower similar to preceding but of a displacement of 4.3 cubic feet per revolution and a speed of about 300 R. P. M., 1910.	1,272.00	Do.
1 General Electric 220-volt, 2-phase, 60-cycle induction motor, 50-horsepower, 690 R. P. M., with driving pinion and outboard bearing, 1910.	643.00	Do.
1 General Electric motor similar to preceding but of 25-horsepower, 1910.....	530.00	Do.
2 slate panels mounting ammeter, 4-pole circuit breaker, etc., included.....		
2 slate panels mounting 2-pole circuit breakers, contractors and relays for remote control, 1912.	385.00	Do.
2 hand starters included.		
1 station voltmeter included.		
Compressor foundations, pipe trenches and covers, air reservoirs, and installing apparatus, etc., exclusive of preparing station, estimated (see plans Nos. 1274-1287).	3,340.00	
Total cost of North Philadelphia Station, including Batcheller commission...	9,526.44	

	Cost.	Present condition,
READING TERMINAL STATION.		
1 8-inch gravity transmitter complete as described, 1909.....	\$676.00	Good,
1 8-inch tilting tube closed receiver, 1909, estimated.....	1,700.00	Do.
1 steel carrier rack, estimated.....	50.00	Do.
1 chute from train floor, 1898.....	75.00	Do.
Construction of inspection pit and installing apparatus and piping, etc., as per plan No. 1193, estimated.....	1,350.00	Do.
Total cost of Reading Terminal Station, including Batcheller commission....	3,851.00	
PENN SQUARE, OR BROAD STREET STATION.		
2 8-inch gravity transmitters complete as described, 1910.....	1,352.00	Good,
1 8-inch double-decked centrifugal receiver (equivalent to 2 receivers) complete as described, 1910.....	1,372.00	Do.
1 gauge board, mounting 3 pressure gauges, 1910.....	40.00	Do.
1 steel carrier rack, 1910.....	50.00	Do.
3 Ingersoll-Rand duplex reciprocating air compressors, cylinders 21 inches by 10-inch stroke, Corliss type valve gear, automatic lubricators, and provision for mounting motor armature directly on driving shaft, 1910.....	3,300.00	} Do.
	3,000.00	
	3,000.00	
1 Westinghouse D. C. 220-volt, 50-horsepower, shunt-wound electric motor, 160 R. P. M., with driving pinion, 1910.....	2,340.00	Do.
1 Westinghouse motor similar to preceding, 35-horsepower, 160 R. P. M., 1910.....	1,200.00	Do.
1 Westinghouse motor similar to preceding, 23-horsepower, 160 R. P. M., 1910.....	1,000.00	Do.
3 slate panels, with ammeters, 2 pole circuit breakers, field regulators, and starting rheostats included.....		
3 slate panels, circuit breakers, contactors, and relays for remote control, 1912.....	479.00	Do.
1 station voltmeter, 1910.....	42.00	
Compressor foundations, pipe trenches and covers, and installing apparatus, etc., as per plans Nos. 1276-1293, including preparing station, plans, etc.	3,765.00	
Total cost of station, Broad Street, including Batcheller commission.....	20,940.00	
STATION J.		
2 8-inch gravity transmitters, complete, as described, 1908.....	1,352.00	Good,
1 8-inch double-decked centrifugal receiver (equivalent to 2 receivers), complete, as described, 1908.....	1,372.00	Do.
1 gauge board mounting gauges and 3 alarm whistles, 1908.....	40.00	Do.
1 steel carrier rack, 1908.....	50.00	Do.
3 Ingersoll-Rand duplex reciprocating compressors, cylinders 21 inches by 10-inch stroke, about 160 R. P. M. Corliss type valve gear with automatic lubricators, Morse silent chain drive, chain guards, etc., 1908.....	3,800.00	} Do.
	3,500.00	
	3,500.00	
1 Westinghouse 220-volt, 2-phase, 60-cycle induction motor, 50-horsepower, 690 R. P. M. driving pinion, 1908.....	716.00	Do.
1 Westinghouse motor similar to preceding but of 35 horsepower, 1908.....	600.00	Do.
1 Westinghouse motor similar to preceding but of 21.6 horsepower, 1908.....	521.00	Do.
3 slate panels equipped with ammeter, 4-pole circuit breakers, etc., included.....		
3 slate panels equipped with 2-pole circuit breakers, contactors, and relays for remote control, 1912.....	770.00	Do.
3 slate panels, mounting throw-over switches included.....		
3 hand starters included.....		
1 station voltmeter, 1908.....	42.00	Do.
Compressor foundations, pipe trenches and covers, and installing apparatus, etc., per plans Nos. 1107-1108, including preparing station, plans, etc.	9,808.00	
Total cost of Station J, including Batcheller commission.....	26,071.00	
STATION C.		
1 8-inch gravity transmitter as described, 1908.....	676.00	Good,
1 8-inch centrifugal receiver complete as described, 1908.....	686.00	Do.
1 gauge board mounting 1 pressure gauge and alarm whistle, 1908, estimated.....	30.00	Do.
1 steel carrier rack, 1908.....	50.00	Do.
2 Ingersoll-Rand duplex air compressors, cylinders 21 inches by 10-inch stroke, Corliss valve gear, speed about 160 R. P. M., automatic lubricators, Morse chain drive, chain guards, etc., 1908.....	3,800.00	Do.
	3,500.00	Do.
1 Westinghouse 220-volt, 2-phase, 60-cycle, induction motor, 50 horsepower, 690 R. P. M., with driving pinion, 1908.....	716.00	Do.
1 Westinghouse motor similar to preceding, 21.6 horsepower, 690 R. P. M., 1908....	521.00	Do.
2 slate panels mounting ammeters, 4-pole circuit breakers, contactors, etc., included.....		
2 slate panels mounting 2-pole circuit breakers, contactors, relays, etc., for remote control, 1912.....	385.00	Do.
2 panels for throw-over switches, included.....		
2 hand starters, included.....		
1 station voltmeter, 1908.....	42.00	Do.
Compressor foundations, pipe trenches and covers, cost of and installing apparatus, etc., as per plans Nos. 823 and 1100, including preparing station, plans, etc.	5,384.00	Do.
Total cost for Station C, including Batcheller commission.....	15,790.00	

	Cost.	Present condition.
SOUTHWARK STATION.		
2 8-inch gravity transmitters, complete as described, 1908.....	\$1,352.00	Good.
1 8-inch double-decked centrifugal receiver (equivalent to 2 receivers), complete as described, 1908.	1,372.00	Do.
1 gauge board, mounting 3 gauges and alarm whistles, 1908, estimated	40.00	Do.
1 steel carrier rack, 1908.....	50.00	Do.
3 Ingersoll-Rand duplex, reciprocating air compressors, cylinders 21 inches by 10-inch stroke, about 160 R. P. M. Corliss valve gear, automatic lubricators, Morse silent chain drive, chain guard, etc., 1908.	{ 3,800.00 3,500.00 3,500.00 }	{ Do.
1 Westinghouse 220-volt, 2-phase, 60-cycle induction motor, 50-horsepower, 690 R. P. M. driving pinion, 1908.	716.00	Do.
1 Westinghouse motor, similar to preceding, 24.5 horsepower, 1908.....	600.00	Do.
1 Westinghouse motor, similar to preceding, 21.6-horsepower, 1908.....	521.00	Do.
3 slate panels, mounting ammeters, 4-pole circuit breaker, etc., included.		
3 slate panels, mounting 2-pole circuit breakers, contactors and relays for remote control, 1912.	695.00	Do.
4 slate panels, mounting throw-over switches, included.		
3 hand starters included.		
1 station voltmeter, 1908.....	42.00	Do.
Cost of compressor foundations, pipe trenches and covers, installing apparatus, etc., as per plans Nos. 1109-1149, exclusive of preparing station, estimated.	8,741.52	
Total cost of Southwark Station, including Batcheller commission.....	24,929.52	
STATION D.		
1 8-inch gravity transmitter complete as described, 1908.....	676.00	Good.
1 8-inch centrifugal receiver complete as described, 1908.....	686.00	Do.
1 gauge board mounting one pressure gauge and alarm whistles, 1908, estimated...	30.00	Do.
1 steel carrier rack, 1908.....	50.00	Do.
2 Ingersoll-Rand duplex reciprocating air compressors, cylinders 21 inches by 10 inch stroke, Corliss valve gear, about 160 R. P. M., automatic lubricators, Morse silent chain drive, chain guards, etc., 1908.	{ 3,715.00 3,418.00 }	{ Do.
1 Westinghouse 220-volt, 2-phase, 60-cycle induction motor, 50-horsepower, 690 R. P. M., with driving pinion, 1908.	716.00	Do.
1 Westinghouse motor similar to preceding 21.6 horsepower, 690 R. P. M., 1908....	521.00	Do.
2 slate panels mounting ammeters and 4-pole circuit breakers, included.		
2 slate panels mounting 2-pole circuit breakers, contactors, relays, etc., for remote control, 1912.	348.00	Do.
2 hand starters, included.		
1 station voltmeter, 1908.....	42.00	Do.
Cost of foundations, pipe trenches and covers, and installing apparatus, etc., as per plans Nos. 1061-1148, exclusive of preparing station.	5,509.08	
Total cost of Station D, including Batcheller commission.....	15,711.08	
BOURSE STATION.		
1 6-inch cradle transmitter, 1908, estimated.....	1,500.00	Good.
1 6-inch tilting tube closed receiver, 1893, estimated.....	1,200.00	Do.
1 wooden carrier rack, 1893.....	20.00	Do.
Cost of piping, installing apparatus, etc., exclusive of preparing station, estimated..	1,468.00	
Total cost Bourse Station, including Batcheller commission.....	4,188.00	

New list carrier parts on hand at the shop.

6-inch:	
11 carriers, complete, at \$15.....	\$165.00
60 shells, at \$1.60.	96.00
50 body rings, at \$1.25.....	62.50
50 screw rings, at 60 cents.....	30.00
651 fingers, at 14 cents.....	91.14
148 lids, at 32 cents.	47.36
135 knee pieces, at 5 cents.....	6.75
75 hinges, at 10 cents.	7.50
55 hinge blocks, at 10 cents.....	5.50
157 brass washers, at 5½ cents.....	8.64
200 eccentrics, at 3¼ cents.....	6.50
110 bottoms, at 15 cents.....	16.50
102 packing rings, at 17½ cents.....	17.85
75 levers, at 10 cents.....	7.50
50 bottom bolts, at 8 cents.....	4.00
	572.74

8-inch:

416 new carriers, complete, at \$20.....	\$8, 320. 00
183 shells, at 95 cents.....	173. 85
250 bottoms, at 36 cents.....	90. 00
270 sleeves, at 33 cents.....	89. 10
442 packing rings, at 71 cents.....	313. 82
600 lid rings, at 15 cents.....	90. 00
1,064 retaining rings, at 15 cents.....	159. 60
1,025 lids, at 20 cents.....	205. 00
565 washers, at 19 cents.....	107. 35
379 levers, at 12½ cents.....	47. 38
511 lock sockets, at 11½ cents.....	58. 76
492 lock plungers, at 2 cents.....	9. 84
395 lock springs, at 63 cents.....	248. 85
600 lock washers, at 2 cents.....	12. 00
176 cams, finished, at 26 cents.....	45. 76
675 cams, not finished, at 4 cents.....	27. 00
211 bolts for levers, at 5 cents.....	10. 55
853 label holders, at 1 cent.....	8. 53
677 cam hinges, at 2½ cents.....	16. 92
200 hinge blocks, at 14 cents.....	28. 00
259 safety springs, at 12½ cents.....	32. 37
155 buffer disks, at 75 cents.....	116. 25

Total value of carrier parts.....	10, 783. 67
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Inventory of machine shop, February, 1913.

LIST OF MATERIAL.

1 Ferracute punch press.....	\$315. 00
1 lathe, Prentice Bros., 24-inch swing.....	800. 00
1 lathe, Hamilton & Co., 12-inch swing.....	200. 00
1 lathe, Prentice Bros., 18-inch swing.....	450. 00
1 spread lathe, Patterson, Gottfried & Hunter.....	50. 00
1 shaper, Girard Machine & Tool Co.....	350. 00
1 large drill press, F. Toomery & Co.....	150. 00
1 large drill press, Aurora Tool Co.....	125. 00
1 large drill press, no name.....	50. 00
1 grinder.....	25. 00
1 gas blower pump, complete.....	25. 00
1 motor and rheostat, complete.....	100. 00
1 Regal electric-engine pump, complete.....	200. 00
1 hand pump with hose.....	50. 00
Belts, pulleys, and shafting.....	100. 00
1 kit shop tools.....	150. 00
14 screw jacks, various sizes.....	40. 00
1 chronograph.....	50. 00
1 tool grinder.....	60. 00

3, 290. 00

STOCK IN WEST PHILADELPHIA STORE YARD.

1,105 feet 8-inch pipe, at \$1.35.....	\$1, 491. 75
2 dutchmen, complete, at \$50.....	100. 00
1 cradle transmitter, complete.....	1, 200. 00
1 8-inch tilting tube receiver, complete.....	1, 500. 00
1 engine and contractor's equipment.....	2, 000. 00
40 feet 6-inch tubing, special.....	129. 00
40 8-inch spigots, at \$14.50.....	580. 00
30 8-inch reducers, at \$14.50.....	435. 00
10 8-inch ells, gas pipe, at \$4.75.....	47. 50
7 8-inch sliding valves, at \$15.....	105. 00
6 $\frac{1}{36}$ -horsepower motors, at \$12.....	72. 00

Total shop equipment and reserve apparatus.....	7, 660. 25
Carrier parts.....	10, 783. 00

Total repair supplies and equipment.....	22, 306. 66
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Statement of cost of electric power for each station for year ending Dec. 31, 1912, *Pneumatic Transit Co.*

Central post office.....	\$7, 952. 64
Station O.....	4, 160. 00
Station C.....	1, 199. 70
Station S.....	4, 730. 58
Station J.....	3, 025. 22
Station D.....	563. 78
Station Southwark.....	1, 659. 20
Station Broad Street.....	3, 662. 80
Station North Philadelphia.....	1, 046. 40
Station Fairhill.....	3, 199. 40
Total.....	31, 199. 72

Statement for the year ending Dec. 31, 1912, *Pneumatic Transit Co.*

Operating:		
Electric power for operating tubes.....	\$31, 199. 72	
Power regulation.....	7, 957. 72	
Station labor.....	26, 204. 13	
Wagon service.....	286. 38	
Linemen's expenses.....	406. 28	
Fines.....	80. 78	
		\$66, 135. 01
Maintenance:		
Electric power for repair shop.....	113. 19	
Repair-shop labor.....	1, 452. 42	
Machinery repairs.....	2, 639. 00	
Line repairs.....	1, 722. 09	
Supplies.....	639. 64	
Freight and hauling.....	190. 69	
		6, 756. 03
General:		
Salaries and administration.....	2, 885. 95	
Rent of office and repair shop.....	1, 712. 64	
Telephones.....	652. 91	
Stationery and postage.....	112. 17	
Office expense.....	145. 01	
General expense.....	707. 36	
Legal and municipal expense.....	784. 04	
Insurance.....	104. 99	
Taxes.....	2, 754. 21	
		9, 859. 28
Total.....		82, 750. 32
Depreciation.....		4, 669. 50
		87, 419. 82

COST OF CONSTRUCTION OF LINE B. S. S.-J-C, PHILADELPHIA, AS SHOWN BY BILLS AFTER ITS COMPLETION FEB. 4, 1908.

Distance exclusive of terminals.

	Feet.	Miles.
B. S. S.-J.....	6, 531	1. 239
J-C.....	4, 639	. 8825
Total.....	11, 170	2. 1215

NOTE.—At the time of this estimate this line was being operated temporarily J-B. S. S.-J with a closed receiver at the B. S. S.; hence its cost was somewhat less than it is at present with the two compressors installed at the B. S. S.
Items marked * are part of an order comprising other lines or stations not included in this estimate. Items marked † are part of an order involving other stations on this line. In both cases the amount chargeable is estimated on the basis of the proportionate part of the whole which the item represents. Lengths after change at B. S. S., 2.1282.

Station equipment.

B. S. S.

Transmitter, 1 (Frank Rittenhouse).....	\$531.00
Closed receiver, 1 (Kelly).....	185.00
Air piping between receiver and transmitter (West End Heating & Engineering Co.).....	59.64
Special flanged pieces: 1 bell and flange 1 foot 5 $\frac{1}{8}$ inches long; 1 double flange 7 feet 9 inches long (flanges—McNeely, \$3.90; McDonald Machine Co., estimate, \$10).....	13.90
Casting (included in price of transmitter).....	
Erecting terminals (our own men estimate) (closed receiver, transmitter).....	20.00
Restoring corrugated-iron ceiling (our men estimate).....	5.00
Hanger for tube (Brewer Bros.).....	7.35
Excavation of pit for transmitters (Evers) (cost, plus 10 per cent).....	838.25
Lumber for supporting floor over excavation (Evers).....	37.24
Restoring (Evers, \$13.97; our own men estimate, \$5).....	18.97
Painting terminals and air piping (estimate †).....	20.00
Special S pipe, receiver to transmitter (estimate *).....	35.00
Counter for transmitter (Schaeffer & Budenburg).....	10.50
Stopper for transmitter (Julius Ruith).....	1.00
Temporary planking floor of truck room, material and labor (Evers), cost, plus 10 per cent.....	97.07
Changing old line at B. S. S. air piping (West End Heating & Engineering Co.).....	186.99
	<hr/>
	2,066.91
Cost of subsequently installing compressing plant.....	16,243.90
	<hr/>
	18,310.81

J.

Transmitters, 2 at \$531 (Rittenhouse).....	\$1,062.00
Receivers:	
1 upper deck (Geo. V. Cresson & Co.).....	686.00
1 lower deck (Geo. V. Cresson & Co.).....	686.00
(Including gate valves † castings and regulating valves.)	
Compressors (Ingersoll-Rand Co.):	
2, at \$3,500.....	7,000.00
1, at \$3,800.....	3,800.00
Delivered and erected, including Morse chains.	
Motors:	
150 horsepower (Westinghouse).....	719.00
130.2 horsepower (Westinghouse).....	601.00
121.6 horsepower.....	521.00
Motors, 2-phase, 7,200 alt. 220 volt 690. Price includes auto-starters and panels each provided with ammeters and circuit breaker, also delivery and erection. Meter panel, 2 integrating wattmeters, 4-pole switch and fuse blocks furnished by the Philadelphia Electric Co., transformers and inclosures (furnished without charge by Philadelphia Electric Co.).....	1,488.93
Air piping, including gauges and gauge connections (West End Heating & Engineering Co.)	
Electric conduits underground, auto-starters to motors (J. H. Buckanan, estimate †).....	49.50
Electric conduits, overhead from transformers (service switch) to meter panel, thence to switchboard; also cables, service, switch to motors, also electric lights and gauge board.....	272.00
Support for auto-starters (John Maneely).....	10.16
Trench frames (Steward & Stevens, estimate †).....	31.25
	<hr/>
	65.70
Building foundations and pipe trenches, restoring floor, facing walls with lath and plaster, cutting one door, building wall across one end of room, cutting wall to it in adjoining basement, cementing entire adjoining basement, cost plus 10 per cent (Evers).....	3,601.37
Moving gas pipes and fixtures, heater, sink, wire partitions in post-office building; also connecting drains from areaway to sewer (Rockett cost)....	397.61
Oil separators, 2 at \$61.50 (Warren & Webster, Maneely)	123.00

Screen castings, 2 at \$40 (estimate * Geo. V. Cresson & Co.).....	\$80.00
Pneumatic circuit breakers (Rittenhouse), 3 at \$28.....	84.00
Alarm whistles (American Steam Gauge Co.), 3 at \$4.35.....	13.05
Metal ceiling (Penn Metal Ceiling Co.).....	134.00
Painting terminals, compressors, piping, walls, ceiling, foundations, etc. (estimate †).....	150.00
Voltmeter and swinging arm (Westinghouse).....	42.00
Pipe supports under air piping (Brewer Bros.) (2, \$16; 8, \$35.75).....	51.75
Lockers (included in bill for extras).....	
Oil can and filters, 2 at \$6, and 1 at \$25.....	37.00
Chain guards, 3 at \$47 (Strandwitz & Scott).....	141.00
Handling mechanism for regulating valves (Rittenhouse, estimate †)....	107.00
Special flanged pieces:	
1, 10 inches long, \$27.50.....	27.50
2, 4 by 6½ inches long, \$51.70 (estimate).....	103.40
Oil drips, 3 at \$4.....	12.00
Counters for transmitter, 2 at \$10.50.....	21.00
Stoppers for transmitter, 2 at \$1.....	2.00
Old boiler tubes for foundation bolts (Henry A. Hitner's Sons), 1½ cents per pound (estimate).....	15.00
2 pieces of 6-inch I beam, 9 feet (12½ pounds), for door and window (Steward & Stevens).....	6.10
Extra charge for 4-pole breakers instead of 2-pole:	
2, 100 amperes, at \$45.....	90.00
1, 50 amperes, at \$25.....	25.00
Pipe supports under tubes (Brewer Bros.).....	13.95
Extra air piping for temporary connection to operate to B. S. S. and return (west end).....	101.97
Erecting terminals, our men (estimate), \$20; Cresson's men (estimate), \$45.....	65.00
Total for equipment of Station J.....	22,437.24

C.

Transmitter, 1 (Rittenhouse).....	\$531.00
Receiver, 1 lower deck (Geo. V. Cresson & Co.).....	686.00
Compressors:	
1, at \$3,500.....	3,500.00
1, at \$3,800.....	3,800.00
Motors:	
1 50-horsepower (estimate *).....	719.00
1 21.6-horsepower (estimate *).....	521.00
Air piping, gauges, and gauge piping (West End Heating & Engineering Co.).....	863.00
Conduits, overhead, all cables from service switch to motors, electric-light conduits and wiring, gauge board, etc. (United Electric Construction Co.).....	183.00
Support for auto starters (Maneely).....	7.05
Trench frames (Steward & Stevens) (estimate †).....	18.70
Building foundations and pipe trenches, restoring floor, facing walls with lath and plaster, building partition across one side of room, cost plus 10 per cent (Evers).....	1,565.45
Handling mechanism for regulating valves (estimate †).....	78.00
Oil separators, 1.....	61.50
Screen casting, 1 (estimate *).....	40.00
Pneumatic circuit breakers, 2, at \$28.....	56.00
Alarm whistles, 1.....	4.35
Metal ceiling (Penn Metal Ceiling Co.).....	139.50
Painting (estimate †).....	183.00
Voltmeter and swinging arm.....	42.00
Lockers (included in bills for extras).....	
Oil can and filter (Murray & Murray).....	37.00
Chain guards, 2, at \$45.50.....	91.00
Special flanged pieces (Geo. V. Cresson & Co.):	
1, 5 feet 8½ inches long (estimate *).....	64.63
1, 10 feet 2½ inches long (estimate *).....	115.67

Oil drips, 2, at \$4.....	\$8. 00
Counter for transmitter.....	10. 50
Stopper for transmitter.....	1. 00
Old boiler tubes for foundation bolts, 1½ cents per pound (estimate)....	10. 80
Extra charge for 4-pole breakers instead of 2-pole:	
1 100-ampere.....	45. 00
1 50-ampere.....	25. 00
Stirrups, etc., for supporting tubes (Brewer Bros.).....	12. 10
Erecting terminals:	
(Cresson's men, \$30), (our own men, estimate, \$10)	40. 00
Conduits underground (Buchanan).....	33. 00
Extra for wiring.....	10. 00
Total equipment of Station C.....	13, 589. 06

Street materials.

Tubing, 21,862.6 feet. at \$1.33 (R. D. Wood & Co.).....	\$29, 514. 51
(Short lengths made from defective pieces same price per foot.)	
Bends (Geo. V. Cresson & Co.):	
90°, 22, at \$191.....	4, 202. 00
45°, 20, at \$105.....	2, 100. 00
Reducers, 73, at \$15 (Rittenhouse) (one was broken accidentally)	855. 00
Drip lengths, 13,720 pounds, at 10 cents (R. D. Wood & Co.).....	936. 00
Closing lengths (none used on this line).	
Manhole covers, 41, at \$10 (Clark's Iron Foundry).....	410. 00
Rails for manhole tops, \$12.50 per manhole ¹ (J. H. Oliver & Co.)	512. 00
Channels for carrying tubes and conduit across sewers (Steward & Stevens).....	12. 52
Rubber rings for bends (Revere Rubber Co.) 100 pounds, at \$1.40 per pound.....	15. 28
Step irons for man holes, 4 per manhole. at 10 cents each.....	16. 40
Five-eighths bolts for bends (Hoopes & Townsend) 800, at \$2.50 per C....	20. 00
3-inch iron conduit over subway, Arch Street and Sixteenth and Cuthbert Streets (1,087 feet 6 inches, with couplings, etc., cut and threaded, John Maneely)	304. 54
Special casting for joining iron and terra cotta conduit (Clark's Iron Foundry).....	3. 00
Sleeves for covering leaking bells, 2½ sets. at \$8 (estimate).....	20. 00
Sleeves for covering leaking tube (U. G. I.).....	4. 31
Hangers for tube over subway (Brewer Bros.).....	4. 85
Nails used at Stations J and C (Maddock & Co.)	2. 29
Mandrels, 4 (2 broken), at \$10	40. 00
Expansion plug (no new ones used).	
Pattern for S, flanged price, at B. S. S. (Buchanan)	72. 00
Pattern for screen casting.	
Black protective paint for tubes over subway.....	2. 45
Iron cement (Paxon).....	1. 50

39, 049. 15

Street work.

Earth, 8,383.34 cubic yards, at \$2.95 (Evers).....	\$24, 730. 86
Excavation, rock, 47.48 cubic yards, at \$3.25 (Evers) (excavation includes cutting pavement, storing earth if necessary, back filling, carting away surplus, and temporary repairing. Trench figured 32 inches wide or 36 inches if depth exceeds 6 feet; conduit trench, 13 inches wide).....	154. 31
Laying tubing, 22,822.6 feet, at 30 cents (Evers) (bends and drips counted double length).....	6, 846. 78
4-duct conduit furnished and laid, 10,644.09 feet, at 40 cents (Evers) (with 3-inch concrete on every side).....	4, 256. 83
Brickwork in manholes, 118,741, at \$22.50 per manhole (Evers) (number of manholes, 41).....	2, 643. 40
Openings in foundation walls, 166.91 cubic feet, at \$1 (Evers).....	166. 91
Concrete for bottom of manholes, 28.703 cubic yards, at \$7.50 (Evers)...	215. 28

¹ Six rails 5 feet 9 inches long and six 3 feet long 4 inches deep, 50 pounds, at \$0.237 per foot.

Extras: Moving drains, fluming, and cradling sewers, altering sewer inlets, cutting and restoring manholes of other companies (without Oct.).	\$1, 914. 08
Extra support under tube where needed (Evers) (this work done at cost plus 10 per cent) for Oct. (estimate).....	700. 00
Gas company's bills for moving mains and services (principally to get them out of our manholes).....	413. 26
Water bureau bills for moving mains and services.....	189. 01
Repaving sidewalks where tube is underneath.....	237. 96
Also across floor of baggage room, B. S. S. (Evers) (cost plus 10 per cent)..<	722. 15
Cement paving in baggage room (Evers) (cost plus 10 per cent).....	722. 13
Cutting special lengths, 9, at \$2.50 (others were made up without cutting by using short lengths).....	22. 50
Cutting 10-inch holes in girders over subway (P. J. Mahan).....	115. 00
Drilling holes for hangers over subway (P. J. Mahan).....	14. 23
Lagging tubes over subway to prevent freezing (Ehret Magnesia Co.), 80 feet, at \$2 (use of scaffolding \$15).....	363. 12
Cutting 3-inch holes through plates at subway for conduits (P. J. Mahan).	44. 27
Plumbers' bills not included in extras above for moving drains, etc....	15. 98
Repairing by city contractors on streets, railroad streets:	
3,021.35 square yards of asphalt, at \$1.85.....	5, 589. 49
646.6 square yards of granite block, at 22 cents.....	142. 25
405.96 square yards of granite block, at 36.3 cents.....	148. 36
40.10 square yards of crossing reset, at 19 cents.....	7. 62
Plus 5 per cent on above items to city for inspectors.....	294. 38
Repaving by private contract, contractors to guarantee:	
Vulcanite Paving Co., 80 square yards asphalt, Oxford Street, at \$1.85.	168. 00
Vulcanite Paving Co., 170 square yards asphalt, North Street, at \$2.43.	413. 10
Richardson & Ross, 730.78 square yards asphalt, Cuthbert Street, at \$2.43.....	745. 79
Changing old line at B. S. S.:	
Evers's men.....	\$103. 24
Our men.....	102. 54
	205. 78
Restoring underside of bridge at subway (estimate).....	300. 00
Total of street work.....	53, 502. 93

Freight and hauling.

Freight on tubes from Camden, N. J., to Philadelphia (shown by receipt, \$333.79; balance estimated, \$98.59).....	\$432. 38
Cartage of tubing (included in price for laying).	
Cartage of machinery from Cressons, etc. (John McCullough).....	52. 11
Freight on transmitters, etc., from Norristown.....	10. 21
R. D. Wood, blocking 4 cars to hold pipes in place.....	25. 00
	519. 70
Line equipment, carriers, 100, at \$20.....	2, 000. 00

Plans and inspection.

Inspectors.....	\$1, 075. 00
Draftsman (9 months).....	900. 00
Drafting materials (estimated).....	100. 00
City plans, 2.118 miles.....	382. 58
Blue prints (total 28.27 for this line estimated).....	20. 00
	2, 477. 58

Office and incidentals.

Secretary's time.....	\$300. 00
Stenographer (half of his time).....	260. 00
Chief engineer.....	4. 050. 00
Telephone (one-third of rent for 1 year).....	62. 33
Office rent (one-third of rent of engineering office 1 year).....	333. 33
Third and Chestnut Street office, \$117 per month.....	468. 00
Mr. B.'s expenses to Pittsburgh, testing motors.....	29. 39
Testing concrete made with sand taken from trench (H. S. Sparkman Engineering Co.).....	8. 00
	5, 511. 05

Summary.

Station equipment:

B. S. S.....	\$18,310.81
J.....	22,437.24
C.....	13,589.06
Street materials.....	39,049.15
Street work.....	53,502.93
Freight and hauling.....	519.70
Line equipment.....	2,000.00
Plans and inspection.....	2,477.58
Office, chief engineer, telephones, bookkeeping, etc.....	5,511.05
	<hr/>
	157,397.52
Plus 10 per cent, Batcheller Co.....	15,739.75
	<hr/>
	173,137.27

NOTE.—Work on this line was begun at Station C on June 1, 1907. On August 3 the line was finished to Station J, and work begun on section to B. S. S. On November 1 line was laid to wall of B. S. S. First carrier was sent J-C on December 12; first carrier J-B. S. S.-J. on December 18, and first carrier C-J on December 19. Government was notified of completion on December 21, and accepted line on January 1, 1908. Only one gang was employed on this line. The greatest distance covered in one day was 360 feet, and the greatest in one month, 3,069.99 feet, including 8-90 bends and 4-45 bends.

GEO. E. REID, M. E.

PHILADELPHIA, PA., *February 28, 1913.*

I hereby certify that I have inspected the property described in attached inventory of pneumatic-tube lines and other property owned by the Pneumatic Transit Co., of Philadelphia, Pa., and dated February, 1913.

Unless otherwise stated on the inventory form, I have found the present condition good.

The costs stated for the apparatus, etc., are those furnished by the owning company, but so far as it is possible for me to determine the accuracy of said costs I believe them reasonable.

GEO. E. REID, *Mechanical Engineer.*

WASHINGTON, D. C., *March 3, 1913.*

EXHIBIT J, PHILADELPHIA NO. 2.**FAILURES OF THE PNEUMATIC TUBE TO PERFORM SERVICE DURING THE YEAR 1912
(PNEUMATIC TUBE SERVICE, ROUTE NO. 510006).**

UNITED STATES POST OFFICE,
Philadelphia, Pa.

January 20. Report that no service was performed by the pneumatic tube between Station J and Station C—northbound line—between 1 and 2.04 p. m. on January 19.

During the interruption of service 11 ounces of letter mail, including seven special-delivery letters, were delayed 34 minutes. The southbound line was in operation.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement, under date of January 22, 1912:

“We beg to acknowledge receipt of yours of the 20th instant, reporting the failure of the pneumatic-tube service between Stations J and C, northbound line, from 1 p. m. to 2.04 p. m. on January 19, 1912.

“This failure of service was due to our inability to secure electric power at Station J, owing to the burning out of certain fuses on the main supply line of the Philadelphia Electric Co. The fuses were replaced and the electric current turned on in the shortest possible time, after which the line immediately resumed service.”

January 23. Report that the pneumatic tube between Station D and Southwark Station—eastbound line—was not in full operation from 4.30 p. m. January 23 until 6.15 p. m. January 24, owing to a block in the line, a carrier having become blocked in the eastbound line. During this interruption a wagon furnished by the Pneumatic Transit Co. was placed in service between the central office and Southwark Station, making hourly trips. This service, together with the service performed by the Philadelphia and southwest circuit, No. 4, electric car route 310011, prevented delay in the receipt of mails, except 20 ounces of letter mail for city delivery from Station D, which was delayed 24 hours.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement, under date of January 29, 1912:

"We beg to acknowledge receipt of yours of the 26th instant in regard to the failure of the pneumatic-tube service between Station D and Southwark Station—eastbound line—from 4.30 p. m. January 23 until 6.15 p. m. January 24, 1912. This interruption of service was due to the blocking of the eastbound line at the point where the line crosses South Broad Street on Carpenter Street. The breaking of a house service connection at this point allowed the water to collect in the tube line, where it quickly froze and blocked the carrier. The moment the block was located, the street was dug up, the pipe was thawed out, and the carrier was removed in the shortest possible time, after which the line immediately resumed service."

January 31. Report that no service was performed by the pneumatic tube from 6.40 a. m. to 9.10 a. m. between the central office and Southwark, Station D, Penn Square Station, and Stations J and C, and between Stations S and O, Fairhill and North Philadelphia Stations. During this interruption of service 450 pounds of letter mail arriving at North Philadelphia Station by New York and Pittsburgh train No. 22, due North Philadelphia Station 7.20 a. m., was dispatched by train leaving North Philadelphia Station 7.53 a. m. Delay of 33 minutes.

One hundred and fifty pounds of letter mail arriving by New York and Pittsburgh train 28, due North Philadelphia Station 7.54 a. m., was dispatched by train to Broad Street Station leaving North Philadelphia Station 8.04 a. m. Delay of 10 minutes.

Eleven pounds of letter mail from Fairhill Station to Station O was delayed 1 hour and 37 minutes.

Twenty-seven pounds of letter mail from Fairhill Station to Station O was delayed 1 hour and 37 minutes.

Thirty-eight pounds of letter mail for Stations J and C that should have been forwarded by pneumatic tube from central office was forwarded by Philadelphia and Southwest Circuit R. P. O., trip 11, regular car, and 15 pounds of letter mail from central office for Station S was forwarded by Philadelphia and Frankford trip 9, regular car.

This interruption of service also caused delay of 1 hour and 12 minutes to 2 pounds of letter mail from Station J to central office via Penn Square Station.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of February 2, 1912:

"We desire to acknowledge receipt of your letter of the 1st instant, reporting failure of the pneumatic-tube service on January 31, 1912, from 6.40 a. m. to 9.10 a. m., between central office, Southwark Station and Station D, Penn Square Station, and Stations C and J, and between S and O, Fairhill and North Philadelphia Stations.

"This failure of service was due to our inability to secure electric power on account of the fire at the alternating current plant of the Philadelphia Electric Co., located at Twenty-eighth and Christian Streets. The moment that power was obtainable the pneumatic-tube lines immediately resumed service in the shortest possible time."

February 22. Report that no service was performed by pneumatic tube from 12.30 a. m. to 1.30 a. m. between Fairhill Station and North Philadelphia Station, owing to the lack of electric power. During this interruption of service 44 pounds of letter mail that should have gone through the tube was forwarded from North Philadelphia Station by regular wagon to connect Philadelphia and Chestnut Hill R. P. O., trip 28, at Fairhill Station, and 72 pounds 4 ounces of letter mail that should have been forwarded by tube from Fairhill Station was forwarded by regular wagon. This mail was intended to connect New York and Washington train 66, leaving North Philadelphia Station 1.12 a. m., but missed dispatch by that train and was subsequently dispatched by New York and Pittsburgh train 18, leaving North Philadelphia Station 1.51 a. m., causing a delay of 39 minutes; regular wagons made extra trips for the Pneumatic Transit Co.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of February 28, 1912:

"We desire to acknowledge receipt of yours of the 26th instant, reporting failure of pneumatic-tube service between Fairhill Station and North Philadelphia Station on February 22 from 12.30 a. m. to 1.30 a. m. This failure of service was due to our inability to secure electric power owing to the effect of the terrific windstorm which occurred that night and which blew down wires of the Philadelphia Electric Co.

"The moment power was obtainable the lines were immediately placed in service in the shortest possible time."

March 4. Report that no service was performed by pneumatic tube between central office and Bourse Station from 5.30 p. m. to 7 p. m., March 4, and from 9 a. m. to 10.07 a. m. on March 5. During this interruption of service all mail to and from Bourse Station was dispatched by regular wagon as follows: March 4, 1,600 pounds letter mail; March 5, 12 pounds letter mail.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of March 11, 1912:

"We desire to acknowledge receipt of yours of the 6th instant, reporting failure of the pneumatic-tube service between the central office and the Bourse Station from 5.30 p. m. to 7 p. m., and from 9 a. m. to 10.07 a. m. on March 5, 1912. This failure of service was due to the breaking of the piston on the receiver at the central post-office end of the Bourse line. It was necessary to replace the broken piston with a new one, which was done in the shortest possible time, and the line immediately resumed service."

March 22. Report that no service was performed by the pneumatic tube between central office and Reading Terminal from 5.55 p. m. to 6.10 p. m., owing to a block in the "head" at the Reading Terminal.

During this interruption of service 60 pounds of letter mail was dispatched by regular wagon.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of March 29, 1912:

"We desire to acknowledge the receipt of yours of the 25th instant reporting failure of the pneumatic-tube service between the central post office and the Reading Terminal from 5.55 p. m. to 6.10 p. m. on March 22, 1912. This interruption of service was due to the slipping of the control valve on the time lock of the transmitter at the central office end of the Reading Terminal line, and resulted in the collection of several carriers in the head of the receiver of the Reading Terminal Station. The head was taken off and the carriers removed, thus freeing the line in the shortest possible time, and then the service was immediately resumed."

March 26. Report that no service was performed by pneumatic tube between central office and Bourse Station from 6.02 p. m. to 6.20 p. m., and from 6.28 p. m. to 6.40 p. m., on March 26; this interruption of service was caused by carriers lodged in the head of the Bourse receiver.

On account of this interruption, 8 pouches of letter mail that should have gone through the tube, weight 538 pounds, was carried by regular wagon at 6.50 p. m.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of March 29, 1912:

"We desire to acknowledge receipt of yours of the 27th instant, reporting failure of the pneumatic tube service between central post office and the Bourse Station from 6.02 p. m. to 6.20 p. m., and from 6.28 p. m. to 6.40 p. m. on March 26, 1912. This interruption of the service was due to the blocking of the relief valve in the head of the Bourse Postal Station receiver. The head of the receiver was removed and the foreign substance extracted in the shortest possible time, after which the line immediately resumed service."

March 29. Report that no service was performed by pneumatic tube between Fairhill Station and Station O from 8.45 p. m. to 9.30 p. m. During this interruption of service 10 pounds of letter mail for distribution at the central office was delayed 30 minutes, and 9 pounds for distribution at North Philadelphia Station was delayed 30 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 2, 1912:

"We desire to acknowledge the receipt of yours of the 1st instant, reporting failure of the pneumatic tube service between Fairhill Station and Station O from 8.45 p. m. to 9.30 p. m. on March 29, 1912. This failure of service was due to our inability to secure electrical power, owing to the burning out of the main supply fuses of the Philadelphia Electric Co. The fuses were replaced and the power turned on, after which the line immediately resumed service."

March 30. Report that no service was performed by the pneumatic tube between Fairhill and North Philadelphia Stations from 5.05 p. m. until 5.25 p. m.

During this interruption of service 266 pounds of letter mail intended to connect New York & Pittsburgh train 29, due to leave North Philadelphia Station at 5.37 p. m., and 26 pounds of letter mail, intended to connect New York & Pittsburgh train 44, leaving North Philadelphia Station at 5.29 p. m., missed dispatch.

Mail intended for dispatch by train 29 was subsequently forwarded by train 45, leaving Broad Street Station 8.38 p. m. Delay of 3 hours and 1 minute.

Mail intended to connect train No. 44 was subsequently dispatched by train No. 148, leaving North Philadelphia Station 7.14 p. m. Delay of 1 hour and 45 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 3, 1912:

"We desire to acknowledge receipt of yours of the 2d instant reporting failure of the pneumatic-tube service between Fairhill and North Philadelphia Station from 5.05 p. m. to 5.25 p. m. on March 30, 1912."

"This failure of service was due to the breaking of a chain guard connecting the motor and blower at North Philadelphia Station and thus allowing the chain to slip from the gear wheel and interrupt the service. This chain guard was repaired and the chain replaced as expeditiously as possible and the line immediately placed in service. The following day the repaired chain guard was removed and a new one installed."

April 9. Report that the pneumatic tube performed no service between the central office and Penn Square Station from 3.46 p. m. to 4.15 p. m. During this interruption of service 240 pounds of letter mail that should have gone through the tube was sent by extra wagon furnished by the Pneumatic Transit Co., and 35 pounds of letter mail by regular wagon.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 12, 1912:

"We desire to acknowledge receipt of yours of the 10th instant reporting failure of the pneumatic-tube service between the central post office and Penn Square Station from 3.46 p. m. to 4.15 p. m. on April 9, 1912.

"This failure of service was due to the breaking of a transmitter pin on the retarding mechanism of the gravity transmitter at the central post office end of the central office and Penn Square line.

"The retarder was dismantled and a new pin substituted and the retarder replaced in the shortest possible time, after which the line immediately resumed service."

April 9. Report that no service was performed by the pneumatic tube between the central office and Bourse Station from 5.45 p. m. to 6.10 p. m. During this interruption of service 795 pounds of letter mail that should have gone through the tube was forwarded from the Bourse Station to the central office by regular wagon.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 12, 1912:

"We desire to acknowledge receipt of yours of the 10th instant reporting failure of the pneumatic-tube service between the central office and the Bourse Station from 5.45 p. m. to 6.10 p. m. on April 9, 1912.

"This failure of service was due to the collecting of some foreign substance in the trip valve which controls the head of the Bourse receiver.

"The trip valve was taken apart and the obstruction removed and the valve then replaced as expeditiously as possible. The line was immediately placed in service. At the completion of the scheduled period of operation the receiver was entirely overhauled."

April 17. Report that no service was performed by the pneumatic tube between central office and Reading Terminal Station from 6.14 p. m. to 6.32 p. m., the interruption being caused by a block at the Reading Terminal end of the line.

This interruption of service caused 11 pounds 8 ounces of letter mail intended for dispatch by train No. 323, leaving Reading Terminal 6.30 p. m., to be delayed, mail being subsequently dispatched by train No. 327, leaving Reading Terminal 9 p. m., a delay of 2 hours and 30 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 25, 1912:

"We desire to acknowledge receipt of yours of the 18th instant, reporting failure of pneumatic-tube service between central office and Reading Terminal Station from 6.14 p. m. to 6.32 p. m. on April 17, 1912.

"This failure of service was due to the breaking of a spring on the controlling mechanism that controls the head of the Reading Terminal receiver. The head was removed, carriers released in the shortest possible time, and the line immediately resumed operation."

April 24. Report that the pneumatic tube performed no service between the central office and Penn Square Station from 8.50 p. m. to 8.55 p. m. and from 11.16 p. m. to 11.21 p. m.

There was no mail delayed.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of April 30, 1912:

"We desire to acknowledge receipt of yours of the 27th instant, reporting failure of the pneumatic-tube service between central office and Penn Square Station from 8.50 p. m. to 8.55 p. m. and from 11.16 p. m. to 11.21 p. m., on April 24, 1912.

"This failure of service was due to the blowing out of fuses on the circuits controlling the electric motor operating the compressor at the Penn Square Station engine room. These fuses were replaced and the line immediately resumed service."

April 27. Report that the pneumatic tube performed no service between central office and Station S from 6 p. m. to 6.39 p. m., owing to the transmitter at this office being out of order.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 1, 1912:

"We desire to acknowledge receipt of yours of the 30th ultimo, reporting failure of the pneumatic-tube service between central post office and Station S, from 6 p. m. to 6.39 p. m. on April 27, 1912, owing to the Station S transmitter at the central office being out of order. The retarder on this transmitter was not working in a proper and satisfactory manner, but nevertheless during the time above designated the line was in working order and could and did transmit mail during all this period, although our operators and engineer were utilizing their spare time in repairing the retarding mechanism."

May 10. Report that the pneumatic tube performed no service between Penn Square Station, Reading Terminal, and central office, from 11.10 p. m. to 11.35 p. m. and from 11.46 p. m. to 11.52 p. m., owing to the fact that the transmitter was out of order.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 15, 1912:

"We desire to acknowledge receipt of yours of the 14th instant, reporting failure of the pneumatic-tube service between Penn Square Station, Reading Terminal, and central office on May 10 from 11.10 p. m. to 11.35 p. m. and from 11.45 p. m. to 11.52 p. m.

"This failure of service was due to the slipping of the controlling valve on the transmitter located at the central office of the central post office-Reading Terminal line, thus allowing several carriers to come together at the receiving end of the same line located in the Reading Terminal. The carriers were removed and the controlling valve repaired in the shortest possible time, after which the line immediately resumed service."

May 11. Report that no service was performed by pneumatic tube between Penn Square Station and the central post office from 4.50 p. m. to 5.02 p. m., and from 6.55 p. m. to 7 p. m., owing to the transmitter at Penn Square Station being out of order.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 15, 1912:

"We desire to acknowledge receipt of yours of the 14th instant, reporting failure of pneumatic-tube service between Penn Square Station and central office from 4.50 p. m. to 5.02 p. m., and from 6.55 p. m. to 7 p. m., on May 11, 1912.

"This failure of service was due to the collection of some foreign substance on the retarder valve controlling the transmitter at Penn Square Station on the Penn Square-central office line. The foreign substance was removed in the shortest possible time, after which the line immediately resumed service."

May 17. Report that no service was performed by the pneumatic tube between central office and Bourse Station from 2.10 p. m. to 4.40 p. m., owing to a carrier being stuck in the bend at the central office end of the line.

Thirteen pounds of letter mail from 5 carriers was taken from the line at 3.40 p. m. Delay, one hour.

One special-delivery package containing wool was slightly soiled, but was cleaned and dispatched to destination. On account of the interruption, 250 pounds of letter mail that should have gone through the tube was carried by regular wagon, being received at the central office 4.20 p. m.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 23, 1912:

"We desire to acknowledge receipt of yours of the 18th instant, reporting failure of pneumatic-tube service between central post office and the Bourse Station from 2.40 p. m. to 4.40 p. m. on May 17, 1912.

"This failure of service was due to the sticking of a carrier in the bend of the incoming line at central post office. The bottom screw ring on one of our carriers, due to a latent defect not visible upon examination broke in two and pushed its way toward the end of the carrier, so that when it reached the bend at central post office it wedged itself fast, so that when hit by a subsequent carrier it effectually blocked the line.

"The bend was taken down, the carriers located and removed, and the bend replaced, after which the line immediately resumed service."

May 18. Report that no service was performed by the pneumatic tube between Stations C, J, Penn Square, from 7.45 a. m. to 8.18 a. m.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 23:

"We desire to acknowledge receipt of yours of the 20th instant, reporting failure of the pneumatic-tube service between Stations C, J, and Penn Square from 7.45 a. m. to 8.18 a. m. on May 18, 1912.

"This failure of service was due to the blowing of a fuse on the main electrical circuit leading into Station J, controlled by the Philadelphia Electric Co.

"The fuse was replaced, the compressor started, and the lines placed in service in the shortest possible time."

May 21. Report that no service was performed by the pneumatic tube between central office and Reading Terminal from 8.45 p. m. to 9.50 p. m., owing to a block in west-bound line.

During this interruption of service 205 pounds of letter mail which should have gone through the tube was forwarded by regular wagon making extra trips.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 23:

"We desire to acknowledge receipt of yours of the 22d instant, reporting failure of the pneumatic tube service between the central office and the Reading Terminal on the westbound line, 8.45 p. m. to 9.50 p. m. on May 21, 1912. This failure of service was due to a block in the westbound line, caused by a carrier lever breaking off the carrier in transit, which resulted in blocking the subsequent carriers. The moment the block was located the carriers were released, the lever removed, and the line immediately placed in service."

May 24. Report that no service was performed by the pneumatic tube between Penn Square Station and North Philadelphia Station, 7.10 p. m. to 9.30 p. m. This interruption caused a delay of 62 pounds of letter mail that should have been forwarded by tube. This mail was forwarded by train 9, via Broad Street Station.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 28:

"We desire to acknowledge receipt of yours of the 25th instant, reporting failure of pneumatic tube service between Penn Square Station and North Philadelphia from 7.10 to 9.30 p. m. on May 24, 1912.

"This failure of service was due to our inability to secure power, owing to the fact that the heavy electrical storm which occurred on that date placed the power plants and the lines supplying us current at the stations along this route out of commission during the time designated. The moment power was obtainable the lines were immediately placed in service."

May 24. Report that no service was performed by the pneumatic tube between Southwark Station and central office from 7.25 p. m. to 8.50 p. m.; on account of this interruption 30 pounds of letter mail was delayed 1 hour and 25 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 28:

"We desire to acknowledge receipt of yours of the 25th instant, reporting failure of the pneumatic-tube service between Southwark Station and central post office from 7.25 p. m. to 8.50 p. m., on May 24, 1912.

"This failure of service was due to our inability to secure power with which to operate the motors controlling the compressors at Southwark Station. The heavy electrical storm which occurred that evening placed the power plant and the electrical feed lines out of commission during the above time stated. The moment power was obtainable the tube lines were immediately placed in service."

May 22. Report that the pneumatic tube performed no service between Station O, Fairhill, and North Philadelphia Station between 5 p. m. and 5.20 p. m., owing to an accident to the pneumatic-tube machinery at Station O.

This interruption of service caused a delay to 35 pounds of letter mail intended for dispatch by New York and Pittsburgh train 44, leaving North Philadelphia Station 5.29 p. m. This mail was subsequently dispatched by New York and Washington train 148, leaving North Philadelphia at 7.14 p. m.; delay of 1 hour and 45 minutes.

Also 133 pounds of letter mail missed dispatch by New York and Pittsburgh train 29, leaving North Philadelphia Station at 5.37 p. m. Twenty-three pounds of this mail was subsequently dispatched by train No. 23, leaving North Philadelphia 7.08 p. m.; delay of 1 hour and 31 minutes. The remainder of this mail, 110 pounds, was dispatched by New York and Pittsburgh train 45, leaving Broad Street Station at 8.33 p. m.; delay of 3 hours and 1 minute.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of May 25:

"We desire to acknowledge receipt of yours of the 24th instant, reporting failure of pneumatic-tube service between Station O, Fairhill, and North Philadelphia, 5 p. m. to 5.20 p. m., May 22.

"This failure of service was due to the wedging fast of the upper gate on the north-bound transmitter at Station O, which made it impossible for carriers to be transmitted until the head of the transmitter was removed and the counterweight released. The moment this was done the lines were immediately placed in service and the transmitter entirely overhauled."

June 1. Report that no service was performed by the pneumatic tube between Reading Terminal and the central office from 12.14 p. m. to 12.41 p. m. on account of trouble with machine at the Reading Terminal Station.

In explanation of this irregularity the Pneumatic Transit Co. makes the following statement, under date of June 14, 1912:

"We desire to acknowledge receipt of yours of the 3d instant, reporting failure of pneumatic-tube service between Reading Terminal and central post office between 12.14 p. m. and 12.41 p. m. on June 1, 1912.

"This failure of service was due to the slipping of the piston head in the cylinder controlling the Reading Terminal receiver, which consequently made it impossible to raise or lower the receiver, and thus allowed several carriers to collect in the line. The receiver was dismantled, the carriers removed, and the line freed, and service was resumed in the shortest possible time.

"After the conclusion of the scheduled period of operation, the receiver was entirely overhauled and the piston head securely welded to the piston."

June 4. Report that the pneumatic tube performed no service between central office and the Bourse Station from 5.52 p. m. until 6.06 p. m., owing to a block at the Bourse Station. During this interruption 193 pounds of letter mail that should have gone through the tube were received by regular wagon.

In explanation of this irregularity the Pneumatic Transit Co. makes the following statement under date of June 14:

"We desire to acknowledge receipt of yours of the 5th instant, reporting failure of the pneumatic-tube service between central post office and the Bourse Station from 5.52 p. m. to 6.06 p. m. on June 4, 1912.

"This interruption of service was due to the controlling valve on the transmitter at the central post office end of the Bourse line becoming clogged by some foreign substance in the nature of waste matter, which consequently allowed several carriers to be transmitted without the proper period of time intervening, so that they both came together at the Bourse Station and made it impossible for them to be removed without shutting down the line. This was done in the shortest possible time, after which the line immediately resumed service."

June 19. Report that the pneumatic tube performed no service between Station O and Fairhill Station from 8.40 p. m. to 9.42 p. m.

This interruption of service caused delay in the forwarding of 16 carriers containing letter mail from Station S during that period, orders having been received from Station O to hold this mail at Station S awaiting orders from that station.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of June 21:

"We desire to acknowledge receipt of yours of the 20th instant reporting failure of pneumatic-tube service between Station O and Fairhill Station on June 19 from 8.40 p. m. to 9.42 p. m.

"This failure of service was due to the blowing of fuses on electrical circuits of the lines operating the motors at Station O, which consequently made it impossible to operate our compressors until the fuses were replaced, which was done in the shortest possible time, and the lines immediately resumed service."

June 27. Report that the pneumatic tube performed no service between the central office and Station S from 1.20 a. m. to 2.30 a. m., June 27, and from 6.40 a. m. to 6.53 a. m., June 27.

During this interruption of service two carriers containing mail for North Philadelphia Station were held at Station S from 1.20 to 2.30 a. m., delay of 1 hour and 10 minutes; also six carriers containing mail for central office were held at Station S during this interruption, causing delay in delivery of this mail at central office for 1 hour and 10 minutes. Twenty-five carriers containing mail for central office were held at Station S from 6.40 a. m. to 6.53 a. m., causing delay of 13 minutes in the arrival of this mail at central office.

In explanation of this irregularity the Pneumatic Transit Co. makes the following statement under date of June 29:

"We desire to acknowledge receipt of yours of the 27th instant reporting failure of the pneumatic-tube service between central post office and Station S from 1.20 to 2.30 a. m. and from 6.40 to 6.53 a. m. on June 27, 1912.

"This failure of service was due to the blowing out of electrical fuses on the electric circuits supplying our motors with current at Station S. The fuses were replaced, and the lines resumed service in the shortest possible time.

"The period of service terminated at 1.30 a. m., but owing to the fact that all the mail had not been transmitted the lines were placed in service at 2.30 a. m. in order to transmit the mail both to and from Station S that had been delayed owing to the tube lines' inability to secure power."

July 15. Report that the pneumatic tube performed no service between the central office and Bourse Station from 12.12 p. m. to 7 p. m., July 15, and from 9 a. m. to 7 p. m., July 16, and from 9 a. m. to 7 p. m., July 17, regular service being resumed 9 a. m. on July 18; extra wagon service furnished by the Pneumatic Transit Co., was placed from 12.45 p. m., July 15, until 7 p. m., July 17.

During this interruption of service letter mail that should have gone through the pneumatic tube between the Bourse Station and central office, and from central office to Bourse Station, was dispatched by wagon as follows:

	Pounds.
July 15:	
Bourse Station to central office (regular wagon).....	1, 374
Bourse Station to central office (extra wagon).....	1, 015
Total.....	2, 389
Central office to Bourse Station (regular wagon)	53
July 16:	
Bourse Station to central office (regular wagon).....	2, 085
Bourse Station to central office (extra wagon).....	918
Total.....	3, 003
Central office to Bourse Station (regular wagon)	108
July 17:	
Bourse Station to central office (regular wagon).....	1, 164
Bourse Station to central office (extra wagon).....	1, 510
Total.....	2, 674
Central office to Bourse Station (regular wagon)	141

There was no delay of mail caused by this interruption, as the wagon service performed the same service as the pneumatic tube.

In explanation of this irregularity the Pneumatic Transit Co. makes the following statement under date of July 25, 1912:

"We desire to acknowledge receipt of yours of the 19th instant reporting failure of the pneumatic-tube service between the central post office and the Bourse Station from 12.12 p. m. to 7 p. m., July 15, from 9 a. m. to 7 p. m., July 16, from 9 a. m. to 7 p. m., July 17, 1912. This failure of service was due to the blocking of the eastbound pneumatic-tube line at the corner of Fourth and Chestnut Streets. After the block was located at the point by means of the chronograph, the street was excavated, the bend removed and found to contain two empty carriers, one of which was wedged securely at the opening of the bend. The bend was replaced and the line was immediately replaced in service in the shortest possible time."

July 25. Report that no service was performed by the pneumatic tube between the central office and Bourse Station from 10.05 a. m. to 10.30 a. m. This interruption caused delay of 25 minutes in the dispatch of 5 pounds of mail from the Bourse Station to central office.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of July 30, 1912:

"We desire to acknowledge receipt of yours of the 26th instant reporting failure of the pneumatic-tube service between central office and Bourse Station from 10.05 a. m. to 10.30 a. m. on July 25.

"This interruption was due to the breaking of a cotter pin on the central post office receiver, so that the line had to be closed down in order that it might be removed and a new pin substituted.

"This was done as rapidly as possible and the line immediately placed in service."

July 30. Report that no service was performed between central office and Penn Square Station from 11.35 p. m. to 11.48 p. m. This interruption of service caused a delay of 14½ pounds of mail intended for dispatch by train 1019, leaving Broad Street Station 11.30 p. m., which was subsequently dispatched by train 11, at 4.55 a. m., July 31, a delay of 5 hours and 5 minutes. Also, 12 pounds of southern mail intended for dispatch by New York & Washington train 55, leaving Broad Street Station 11.50 p. m., missed dispatch by that train and was subsequently forwarded by New York & Washington train 53, leaving Broad Street Station 4.34 a. m., July 31, a delay of 4 hours and 44 minutes.

At 11.35 p. m., July 30, an open carrier was received at Penn Square Station from central office, containing 2 packages of letters, one for Jersey City, the other for St. Louis, Mo. These letters were very badly soiled, but not mutilated, were cleaned and forwarded to destination, stamped "Damaged by pneumatic tube." Two letters were in such condition that they could not be forwarded to destination, as addresses were obliterated.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of August 1, 1912:

"We desire to acknowledge receipt of yours of the 31st ultimo, reporting the failure of the pneumatic-tube service between the central office and Penn Square Station from 11.35 p. m. to 11.48 p. m. on June 30.

"This interruption of service was due to a carrier coming open in transit between the central office and Penn Square Station and allowing a bundle of mail to lodge in the bend of the tube line, thus blocking the following carrier.

"The open carrier was due to the lid coming off on account of the breaking of a hinge-block which secures the lid in place. These blocks are manufactured out of the highest grade of steel and the defect which caused the break was such as not to be discovered on a careful examination. The line was freed and placed in service in the shortest possible time."

Report that the pneumatic tube performed no service between central office and Reading Terminal from 11.38 a. m. until 11.52 a. m., on account of a fuse blowing out in the engine room.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of August 29, 1912:

"We desire to acknowledge receipt of yours of the 20th instant reporting failure of the pneumatic-tube service between the central office and Reading Terminal from 11.38 a. m. to 11.52 a. m. on August 19, 1912. This failure of service was due to the burning out of fuses on the main circuits to the switchboards at the central office.

"These fuses are installed to protect our electrical apparatus from an overcharge of the electric current. These fuses were at once replaced and the line immediately resumed service."

August 19. Report that the pneumatic tube performed no service between the central office and Penn Square Station from 11.38 p. m. to 11.44 a. m. and from 12.43 p. m. until 12.48 p. m. on August 19, owing to the blowing out of a fuse.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of August 19, 1912:

"We desire to acknowledge receipt of yours of the 29th instant reporting failure of the pneumatic-tube service between central office and Penn Square Station from 11.38 a. m. to 11.44 a. m., and from 12.43 p. m. to 12.48 a. m. on August 19, 1912.

"This failure of service was due to the burning out of a fuse on the main line circuits leading to our switchboards at the central office, and deprived us of electric current for the period of six minutes until the fuse could be replaced and service resumed.

"The fuse, however, that was installed only lasted one hour until it burned out on account of a latent defect not apparent on close examination, whereupon another fuse was substituted and the line immediately placed in service."

August 24. Report that no service was performed by the pneumatic tube between central office and Reading Terminal from 11.42 to 11.51 a. m. During this time 10 pounds of letter mail for mail room, Reading Terminal, was dispatched by regular wagon making extra trip to Reading Terminal, making connection with the mail.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of August 29, 1912:

"We desire to acknowledge receipt of yours of the 26th instant, reporting failure of the pneumatic-tube service between central post office and Reading Terminal Station from 11.42 a. m. to 11.51 a. m. on August 24, 1912.

"This failure of service was due to the blowing out of the circuit breakers on the switchboard at central office which operates the Reading Terminal line.

"The breakers were replaced, the line freed from carriers, after which the line immediately resumed service."

August 29. Report that the pneumatic tube performed no service between the Penn Square Station and central office—eastbound line—between 11.05 p. m. and 11.25 p. m., on account of an accident to the machinery in Penn Square Station.

On account of this interruption of service mail for the Reading Terminal from Penn Square Station, consisting of 51 packages, weighing 23 pounds, missed connection with train 11, leaving that station 11.30 p. m., and was forwarded to Reading Terminal for subsequent dispatch by train 49, leaving at 2 a. m.; delay of 2 hours and 30 minutes, and train 1, leaving at 4.25 a. m., delay of 4 hours and 55 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement, under date of September 4, 1912:

"We desire to acknowledge receipt of yours of the 31st ultimo, reporting failure of east bound line of the pneumatic-tube service between the Penn Square Station and the central office from 11.05 p. m. to 11.25 p. m. on August 29, 1912.

"This failure of service was due to the breaking of a cotter pin on the retarder mechanism of the transmitter located at Penn Square Station. The retarder was overhauled by our master mechanic and the broken pin replaced as rapidly as possible, after which the line was immediately placed in service."

August 31. Report that the pneumatic tube performed no service between the central office and Penn Square Station from 9.55 p. m. to 10.10 p. m., owing to the transmitter at the central office being out of order.

On account of this interruption 390 pounds of letter mail that should have gone through the tube was dispatched by regular wagon.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement, under date of September 4, 1912:

"We desire to acknowledge receipt of yours of the 3d instant, reporting failure of the pneumatic-tube service between central office and Penn Square Station from 9.55 p. m. to 10.10 p. m. August 31, 1912.

"This failure of service was due to the breaking of a set screw on the cam controlling the trip valve that operates the upper gate of the transmitter located at the central post office end of the Penn Square Station line. The set screw was replaced by our master mechanic, the transmitter overhauled, and the line immediately resumed service."

September 2. Report that no service was performed by the pneumatic tube between the central office and Reading Terminal from 8.35 p. m. to 8.50 p. m. On account of this interruption pouch containing 52 pounds of mail for New York, Genesee & Buffalo railway post office was dispatched from this office by regular wagon, making an extra trip at 8.48 p. m. to connect with train 27, leaving Reading Terminal Station 9 p. m.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement, under date of September 10, 1912:

"We desire to acknowledge receipt of yours of the 3d instant, reporting failure of the pneumatic-tube service between the central office and Reading Terminal from 8.35 p. m. to 8.50 p. m. on September 2, 1912.

"This failure of service was due to the slipping of the time lock on the Reading Terminal line transmitter located at the central office, and thus allowing two carriers to enter and block the receiver in the Reading Terminal Station.

"The line was cleared and the time lock overhauled in the shortest possible time, after which the line immediately resumed service."

September 17. Report that the pneumatic tube performed no service between the central office and Bourse Station from 5.50 p. m. to 7 p. m.

On account of this interruption of service, 780 pounds of mail that should have gone through the tube was transferred by regular wagon; 215 pounds of this was carried by an extra trip of regular wagon. There was no delay in the dispatch of the mails.

In explanation of the irregularity, the Pneumatic Transit Co. makes the following statement under date of September 20, 1912:

"We desire to acknowledge receipt of yours of the 18th instant, reporting the failure of the pneumatic-tube service between the central office and Bourse Station from 5.50 p. m. to 7 p. m. on September 17, 1912. This failure of service was due to the breaking of the piston rod in the cylinder of the receiver at the central post office end of the Bourse line. The broken rod was removed and a new one substituted in the shortest possible time, so that the line was placed in service at the following scheduled time."

September 22. Report that the pneumatic tube performed no service between the central office and Penn Square Station, west bound line, on September 22, between 5 p. m. and 12 p. m., September 23, 24, 25, 26, 27, and 28, all service; and from 4 a. m. to 8 a. m. on September 29, caused by a block in the line.

During this interruption of service, the eastbound line performed full service, there being no interruption between Penn Square Station and central office. During the interruption of service on the westbound line, letter mail that should have been carried by tube was forwarded by regular and extra wagons. These extra wagons were furnished by the Pneumatic Transit Co.

The amount of mail carried by wagons is as follows:

Date.	Regular wagon.	Extra wagon.	Date.	Regular wagon.	Extra wagon.
	<i>Pounds.</i>	<i>Pounds.</i>		<i>Pounds.</i>	<i>Pounds.</i>
Sept. 22.....	698	2,496	Sept. 27.....	8,377	4,379
Sept. 23.....	7,016	2,904	Sept. 28.....	7,331	390
Sept. 24.....	8,596	3,775	Sept. 29.....	772	.....
Sept. 25.....	8,068	3,553			
Sept. 26.....	7,686	2,571		48,544	20,068

There was no delay or damage to mail during this interruption of service.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of September 30, 1912:

"We desire to acknowledge receipt of yours of the 24th instant, reporting failure of pneumatic-tube service between central post office and Penn Square Station on the westbound line from 5 p. m., September 22, until the schedule period of starting September 29, 1912. This failure of service was due to the blocking of the street at the point where Tenth Street crosses Commerce Street. It was necessary for us to tear out the existing line and rebuild it for a distance of at least 40 feet. Our work was hampered very much by the existing municipal obstructions in the street, as well as the fact that the line we were re-laying in part was directly under the line leading to the central office from Station S, so that our work was exceedingly difficult."

October 4. Report that no service was performed by pneumatic tube between Penn Square Station and central office on the eastbound line, from 4.35 a. m. to 12 p. m., and between 4 a. m. and 8.35 a. m., October 5. This interruption was caused by a block at the intersection of Eleventh and Filbert Streets. Full service was performed by the westbound line.

At the time this interruption occurred mail from Pennsylvania Railroad train 101 was being forwarded from Penn Square Station to the central office. Two carriers, one empty and the other containing 5 pounds of letter mail, were taken from the line at 5.30 a. m., October 4, mail being delivered at the central office 5.30 a. m. Four carriers containing 24 pounds of letter mail were taken from the line at 10.25 a. m., same date; this mail being delivered at central office 10.30 a. m. Also, one carrier containing 6 pounds of letter mail was taken from the line at 7.17 p. m., October 4; this mail was delivered to the central office 7.32 p. m.

This interruption of service in the eastbound line caused delay of 1 hour and 10 minutes to 5 pounds of letter mail, received by train 101; 6 hours' delay to 24 pounds of letter mail from the same train; and 15 hours' delay of 6 pounds of letter mail from this train on October 4. In the 6 pounds of mail delayed, received at the central office 7.32 p. m., were two special-delivery letters for delivery in Philadelphia, Pa.

On October 4, 9,794 pounds of letter mail that should have gone through the tube from Penn Square Station to the central office was forwarded by wagon making regular trips; 1,166 pounds that should have been carried by tube on October 5 were forwarded by regular wagons on scheduled trips and regular wagons making extra trips. Total amount of mail carried by wagon that should have gone through the tube was 10,960 pounds.

The extra wagons furnished by the contractor, route 410009, under arrangement with the Pneumatic Transit Co., were employed for the purpose of conveying empty carriers between the central office and Penn Square Station for use on the westbound line.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of October 10, 1912:

"We desire to acknowledge the receipt of yours of the 7th instant, reporting failure of the pneumatic-tube service between Penn Square Station and central office on the the eastbound line from 4.35 a. m. to 12 p. m., on October 4, and from 4 a. m. to 8.35 a. m., on October 5, 1912."

This failure of service was due to the blocking of the eastbound line at the intersection where the line crosses Eleventh Street and Filbert Street, which was caused by the street sinking on account of being undermined by a broken high-pressure water main. Carriers in the line at the time of the block were removed, and in order to repair the line it was found necessary to remove several sections of the old line and install new tubes in their place. The repairs were made in the shortest possible time, after which the line immediately resumed service.

October 5. Report that full service by the pneumatic tube was not performed between the central office and Stations S, and O, between 5.44 and 9.45 a. m.

This partial interruption was caused by defect in the transmitter at the central office end of the line.

This partial interruption of service caused 37 pounds of letter mail and 58 pounds of paper mail for Station O to be dispatched by P. & R. Tr. 719, leaving Reading Terminal Station 7.10 a. m., and 175 pounds of paper mail that should have been carried by the tube for Station S was dispatched by Philadelphia & Frankford trip 9, leaving central office 7.40 a. m., also interfering with the forwarding of mail from North Philadelphia Station, owing to the fact that no carriers were received at that end of the line, 702 pounds of letter mail that should have been dispatched by tube from North Philadelphia Station to the central office was therefore dispatched by trains leaving North Philadelphia Station 7.53, 8.04, and 8.24 a. m., respectively. There was a delay to 22 bundles of letter mail for Station S. This mail did not reach that station until 7.03 a. m., thereby missing first carrier delivery, mail being delivered by the next delivery, which was 9.30 a. m.—delay of 2 hours and 30 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of October 10, 1912:

“We desire to acknowledge the receipt of yours of the 6th instant, reporting failure of the pneumatic-tube line between the central post office and Stations S and O from 5.44 to 9.45 a. m., on October 5, 1912. This partial failure of the service was due to the breaking of the axle on which the lower gate of the central post office transmitter rotates. As it was possible to make the repairs without suspending the operation of the line, this was done and the carriers transmitted by manipulating the lower gate by hand. The repairs were effected in the shortest possible time, and on their completion normal service was at once resumed.”

October 8. Report that no service was performed by the pneumatic tube on the westbound line between central office and Penn Square Station between 4 a. m. and 11.07 a. m. This interruption of service was due to the installation of a new section of tube by the Pneumatic Transit Co. at the intersection of Eleventh and Filbert Streets, to replace the worn-out section at that place. During this interruption of service mail that should have been carried by the pneumatic tube was conveyed by wagons furnished by the Pneumatic Transit Co., as follows:

	Pounds.
Letter mail by regular wagon.....	1, 544
Letter mail by extra wagon	461
Total	2, 005

This interruption caused no delay in forwarding of mail, and no mail was damaged. Full service was performed by the eastbound line between Penn Square Station and central office; regular service on the westbound line was resumed 11.07 a. m., October 8.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of October 10, 1912:

“We desire to acknowledge receipt of yours of the 9th instant, reporting that no service was performed by the westbound line of the pneumatic tube between central post office and Penn Square Station between 4 a. m. and 11.07 a. m., on October 8, 1912.

“This failure of service was due to the fact that at the point where our pneumatic line crosses Eleventh Street on Filbert Street the street has been undermined by the breaking of a high-pressure water main, which caused our tube line to sink, and in order to make the proper repairs, we had to remove several sections of the old line, which was badly damaged, and substitute new tubes. The repairs were made in the shortest possible time, after which the line immediately resumed service.”

October 9. The report that the pneumatic tube performed no service between Station S and Station O from 5.06 p. m. to 5.14 p. m.

This interruption of service caused delay in the dispatch of 48 pounds of letter mail intended to connect New York and Pittsburgh train 44, leaving North Philadelphia Station 6.29 p. m., and New York and Pittsburgh train 29, leaving North Philadelphia Station 5.37 p. m.; 10 pounds of letter mail intended to connect train 29 was subsequently dispatched by train 23, leaving North Philadelphia Station 7.02 p. m. Delay of 1 hour and 35 minutes. Twenty-seven pounds of letter mail intended for dispatch by train 29 were subsequently dispatched by train 45, leaving Broad Street Station at 8.31 p. m., delay of 3 hours and 1 minute. Five pounds of letter mail intended to connect train 44 was subsequently dispatched by train 148, leaving North Philadelphia Station 7.14 p. m., delay of 1 hour and 45 minutes.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of October 26, 1912:

“We desire to acknowledge receipt of yours of the 12th instant, reporting the failure of pneumatic-tube service between Station S and Station O from 5.06 p. m. to 5.14 p. m. on October 9, 1912.

"This failure of service was due to the burning out of the intake valve of the compressor operating the line at Station S and the breaking of both cranks that control the valve and the rocker-arm shaft.

"The broken compressor was shut down and the reserved compressor placed in operation at once, so that the service was immediately resumed."

November 29. Report that the pneumatic tube performed no service between Station S and central office from 3.25 p. m. November 29 until 1.30 a. m. November 30; from 5 a. m. November 30 until 1.30 a. m. December 1, and from 5 a. m. until 6.02 a. m. December 1.

This interruption of service was caused by a block in the line at Tenth and Market Streets, which occurred about 3.25 p. m., November 29. The carrier which caused this block contained 6 pounds of letter mail from Station S for Penn Square Station, and was taken from the tube 11 a. m., November 30, a delay of 19 hours and 35 minutes.

Another carrier containing 4 pounds of first-class mail from Station S for Reading Terminal (mail room) was also taken from the line at 12.05 a. m., November 30; a delay of 8 hours and 40 minutes.

During this interruption of service mail was forwarded from Station S to central office to Philadelphia & Frankford R. P. O. circuit 5, route 310,011, and by extra wagons furnished by the Pneumatic Transit Co.

The only interruption of service on the northbound line occurred on November 29, when 20 pounds of letter mail intended to connect N. Y. & Wash. Tr. 78, due to leave North Philadelphia station 4 p. m., missed dispatch by that train and was subsequently forwarded by N. Y. & Pitts. 44, leaving North Philadelphia station 5.29 p. m.; a delay of 1 hour and 29 minutes.

During the interruption of service, mail was sent from Station S to the central office as follows:

	Pounds.
Nov. 29. Philadelphia & Frankford R. P. O.....	172
Nov. 29. Extra wagon.....	943
Nov. 30. Philadelphia & Frankford R. P. O.....	814
Nov. 30. Extra wagon.....	2, 253
Dec. 1. Extra wagon.....	276
Total	4, 458

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of December 3, 1912:

"We desire to acknowledge receipt of yours of the 2d instant, reporting failure of the pneumatic-tube service between Station S and central office from 3.25 p. m. on November 29 until 1.30 a. m., November 30, from 5 a. m., November 30, until 1.30 a. m., December 1, and from 5 a. m. until 6.02 a. m., December 1.

"This interruption of service was due to the blocking of our tube line on Tenth Street near Hamilton Street., at the point where the Reading Railroad crosses Tenth Street, and was caused by the excavation work conducted by the railroad company undermining our tubes and allowing them to settle. The block was located, the carriers removed, and the necessary repairs made as expeditiously as possible, after which the line was immediately placed in service."

December 3. Report that no service was performed by the pneumatic-tube service between central office and Bourse Station from 4.05 p. m. to 7 p. m. Extra wagon provided by the Pneumatic Transit Co. was placed in service at 4.25 p. m., and 30 pounds of letter mail that should have gone through the tube was dispatched by extra wagon leaving central office 4.25 p. m.; also 14,500 pounds of letter mail that should have been forwarded by tube from Bourse Station to central office was received by regular wagon and 560 pounds by extra wagon, a total weight that should have been transmitted by tube, 20,404 pounds.

In explanation of the irregularity the Pneumatic Transit Co. makes the following statement under date of December 18, 1912:

"We desire to acknowledge receipt of yours of the 5th instant, reporting failure of the pneumatic-tube service on the central post office to Bourse Station line from 4.05 p. m. to 7 p. m., December 3, 1912.

"This failure of service was due to the breaking of axle supporting the upper gates of the transmitter of the Bourse line located at the central post office. The broken axle and gate of the transmitter were removed and new ones substituted in the shortest possible time, after which the line resumed service at the next scheduled period."

EXHIBIT K, PHILADELPHIA NO. 3.**ANALYSIS OF THE INTANGIBLE ASSETS OF THE PNEUMATIC TRANSIT COMPANY.**

At the hearing held on January 8, 1913, by the commission investigating the pneumatic mail-tube situation, there was filed by this company a document showing the actual cash invested in constructing its lines, in the order in which such investments were made, and in addition there was an estimate of the operating loss and unpaid salaries during the company's history.

The document was compiled in such a manner as to show that the actual cash invested in construction would constitute the first investment, and as there was no return during the early years in any shape whatsoever, the interest on the cost of construction would constitute the second investment, unpaid officers' salaries make the third investment, and loss in operation is the fourth investment.

The result is that the four items enumerated above added together constitute the capital invested in the business at the beginning of the ensuing year, and in the years when additional construction is completed the actual sum invested in new construction is likewise added.

When the period is reached in the company's history, that the operation of its plants begins to show a profit, the amount paid either as interest on bonds or dividends on stock is subtracted from the yearly interest charge on the capital invested.

A calculated estimate arrived at in the above manner shows that on December 31, 1912, the sum of \$1,312,509 had been invested in the business comprised of the four items, actual cash used in construction, interest thereon, loss in operation, and unpaid officers' salaries.

The Pneumatic Transit Co. has secured all of its physical tangible assets in the shape of the tube lines by an issue of securities direct to the contractors who built its lines and plants, with the result that our books can not show the actual amount that has been invested in intangible assets, with the single exception of patents which were secured by an issue of \$300,000 of stock.

In order to estimate the value of our intangible assets it is necessary to have recourse to an estimate based on the known factors that enter into such a calculation in a business analagous to our own, such as a street railway. The first item to be considered is that of the legitimate profits of the pioneers.

PROFITS OF PROMOTION.

If there is one fact that is well settled in the appraisalment of the intangible assets of a corporation it is that the promoters of the enterprise are entitled to what is known as the profits of promotion. As our securities have all been issued in the purchase of physical tangible property, the profits of promotion are not available from the company's books, and it is necessary to arrive at this amount from the best available data, which is the amount of actual cash invested in the concern. Our available figures on the cost of construction show that approximately some \$750,000 cash was invested in the business, and an appraisalment of our physical tangible property will sustain this conclusion. A promoter's profit of 10 per cent on this sum would be some \$75,000, a very reasonable amount when it is considered that some 20 years' time has been required to thoroughly establish the industry.

COMMISSION ON CAPITAL SECURED, OR THE EQUIVALENT THEREOF, IN THE SALE OF SECURITIES AT A DISCOUNT.

This company not selling its securities for cash, but issuing them as above stated, has no record of any commissions paid or securities sold at a discount, but the contractors who gave for our securities the existing physical property would have both of these charges to meet in marketing their stock, and an estimate of 10 per cent on the amount of the physical tangible property of \$750,000 would amount to \$75,000, to cover the two items of commission and securities sold at a discount.

As our securities in the nature of bonds pay only to the holders 5 per cent per year and our preferred stock 6 per cent, and our common stock has never paid anything, it is not hard to reach the conclusion that some 4½ per cent or \$75,000 of their par value of approximately \$1,700,000 has been necessary to meet the commission and discount on their sale or distribution. When you consider that the American Pneumatic Service Co., earning almost six times the amount necessary to meet the 7 per cent preferred dividend on its latest issue of preferred stock, preferred not only as to dividends but as to assets, was compelled to dispose of this stock to the underwriters at a 7 per cent discount, our estimate of \$75,000, as above outlined, is a very modest one in this respect.

EXPERIMENTATION AND DEVELOPMENT.

The contractors who received our securities had the burden not only of marketing them and securing the necessary money to reproduce the physical tangible property as required by the terms of the contract, but it was also incumbent upon them to produce the best that was obtainable in the way of a pneumatic-tube system. . During the last 20 years this contracting company has kept a corps of draftsmen at work designing and constructing improvements on every feature of the system, such as pipe-boring plants, brass bend rolls, carrier lids, bends, transmitters, receivers, compressors, carriers, chronographs, dutchmen, packing rings for carriers, bypasses, intermediate receivers, time locks, and power devices for both electrical and steam-operated lines. This experimentation and development has been the necessary foundation on which the enterprise has reached its present state of efficiency, and to deny its importance and necessity would be similar to denying childhood to a man. The estimate of our engineers is that there has been expended in this direction at least \$100,000 in the past 20 years.

INTEREST ON CAPITAL DURING CONSTRUCTION.

In our estimate already referred to, filed with the commission on January 8, 1913, we have not taken into our calculation the item which is considered in this heading, so that when we allow interest on the capital invested in construction during the period of construction we have the sum of \$34,066.14. In arriving at this sum we have taken the total sum involved in the construction and allowed interest for the period of one-half a year and considered it as an additional capital invested. Although the company did not have to meet this charge as a direct charge the contractor who received the company's securities did, and nothing is more firmly established in the laws relating to the value of intangible assets than that interest should be allowed on capital invested in construction during construction. The calculations we have made in regard to this item we have appended hereto.

REPLACEMENT OF OBSOLETE MACHINERY.

No schedule of the intangible assets of a manufacturing or transportation corporation would be complete which did not make allowance for the above item. In the reorganization of the Third Avenue Railroad, where the physical tangible assets were appraised at some \$36,000,000 on appeal from the decision of the public-service commission the Appellate Court of the State of New York sustained an intangible asset of \$6,000,000, approximately, being the cost of the change from a cable system to a trolley system. In our tube system in this city we have had to meet the same item on a number of occasions, such as at the central post office, when we displaced a Clayton steam compressor and substituted an electric-driven Ingersoll-Rand compressor in 1905; and in 1908, when we changed the type of transmitters at the Bourse post office; also when we made the Reading Terminal an independent line and scrapped two-wheel intermediates and their accompanying switches; and again in 1910, when we installed three electric-driven units at Broad Street Station, in the place of two large Ingersoll Sergeant steam compressors; and in 1912, when we installed a gravity transmitter at the central post-office end of the Bourse line. We estimate that a conservative allowance for this item in the shape of our intangible assets is the sum of \$30,000.

LEGAL EXPENSES.

During the 20 years' existence of the company the cost of operation was so near, if not in excess of the income, that there was very little in the way of legal expenses borne by the company, but the syndicate which took over the first contract, included a lawyer among its members, so that the legal work of the corporation was really paid for by the stock received by the attorney in question from the syndicate.

We have to-day among our stockholders the widows of three deceased lawyers and two lawyers, all of whom received their holdings in lieu of cash payments from the contractors who constructed our lines. We have allowed for this item among our intangible assets the sum of \$40,000, or approximately \$2,000 per year during the history of the company.

FRANCHISES.

The contractors who built our lines in consideration of a payment in securities in addition to the actual construction of the lines were obligated to secure the necessary permits and franchises.

In securing these permits and franchises it was necessary to secure the service of counsel, as well as to work up public sentiment by judicious advertisements, secure

the signature of citizens to petitions in favor of the granting of the same by the municipal bodies, wait upon the mayor, pay the fees of printing, etc. On one occasion it was necessary for the contractors, in order to prevent their ordinance from lapsing, to lay several hundred feet of 8-inch tube line on Spring Garden Street, which begins nowhere and ends a short distance away.

We estimate that while there was no direct charge for the ordinances and only a nominal fee for the permits per se, the amount which we are justified in considering as an intangible asset of the company under this head is the sum of \$20,000.

PATENTS.

The value of a patent or set of patents covering a system or process consists in the fact that it clearly defines the features that are essential to the exploitation of such system or process as distinguished from those which are common to the arts of the day, and thus to a considerable extent secures the owner against interference in the conduct of his business.

It was absolutely essential at the outset that the promoters of this company should know that the system they were about to install under the agreement with the Postmaster General infringed no patents; and, furthermore, that once installed it could not be appropriated by others who had had the advantage of seeing it in operation. For if the contracts had to be tendered for each time they expired or extensions were proposed in competition with any irresponsible "straw bidder," the risk of loss of the original investment would be absolutely prohibitive.

Of the patents which this company secured originally, several have now expired; but the apparatus covered by them had already become obsolete, and the company has never enjoyed more ample patent protection than it does to-day. The earliest patents were fundamental, while the most recent ones relate more to refinements; but as the types of apparatus become more or less standardized the art is narrowed so that the improvements in detail assume an importance hardly less than that possessed by fundamental principles during the initial stages of the enterprise. Although the standard types are now well fixed, recent improvements in detail have therefore assured to the company protection for many years to come.

The value of a set of patents is very difficult to calculate mathematically. The best guide in arriving at the value is perhaps the amount that business men of sound judgment and successful records are willing to pay and accept for them.

The patents of the company are carried upon its books at \$300,000, of which sum \$200,000 is the price paid for the original patents and \$100,000 the price paid for patents subsequently acquired.

ABANDONMENT OF LINES.

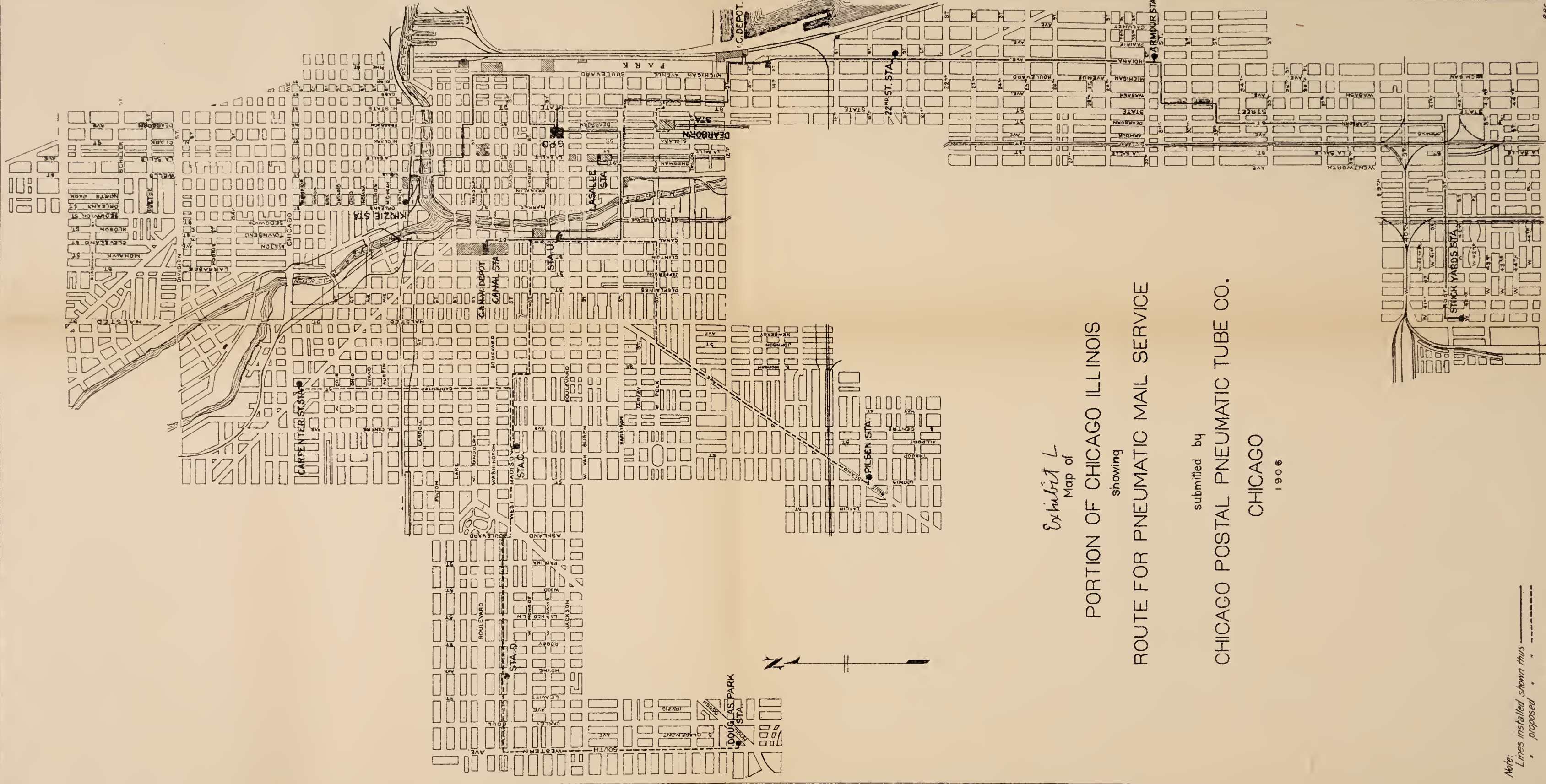
One of the heavy expenses to which a pneumatic-tube company is subjected to under the terms of their contract with the Post Office Department is that of the abandonment of lines on account of the removal of the postal stations. In 1906 when the Broad Street Station to the central post office via Reading Terminal line was made a direct line some twenty-two one-hundredths of a mile of line was abandoned and in 1895 when the East Chestnut Street postal station was moved to the Bourse postal station some 400 feet of line was rendered worthless. It is estimated by our engineers that the company has been subjected to a loss of approximately \$20,000 from this cause alone during its history.

TO RECAPITULATE.

The various items in the nature of intangible assets possessed by the company are as follows:

Profits of promotion.....	\$75, 000. 00
Commissions and discount.....	75, 000. 00
Experimentation and development.....	100, 000. 00
Interest on capital during construction.....	34, 066. 14
Replacement of obsolete machinery.....	30, 000. 00
Legal expenses.....	40, 000. 00
Franchises.....	20, 000. 00
Patents.....	300, 000. 00
Abandonment of lines.....	20, 000. 00
Total.....	694, 066. 14

When the above sum is added to the sum \$1,312,509 already filed with the commission and compiled as aforesaid the total is \$2,006,575.14, the value of all of the company's property including both tangible and intangible property.



Note:
Lines installed shown thus -----
" proposed " - - - - -

Interest on capital during construction.

Bourse construction \$42,000, interest thereon for 6 months \$1,260, and as this constitutes an investment and is unpaid, then the interest on it is compounded until Dec. 31, 1912, the amount is.....	\$4, 068. 00
Broad Street Station to central post-office construction \$60,000, interest thereon for 6 months \$1,800, compounded until Dec. 31, 1912.....	4, 313. 69
Central post office to station S and O construction \$175,700, interest thereon for 6 months compounded until Dec. 31, 1912.....	7, 816. 48
Broad Street Station, J. & C. construction \$154,030, interest thereon for 6 months \$4,620.90, compounded until Dec. 31, 1912.....	6, 183. 72
Southwark, D. & Reading construction \$170,000, interest thereon for 6 months \$5,100, compounded until Dec. 31, 1912.....	6, 438. 63
North Philadelphia and Fairhill construction \$117,000, interest thereon for 6 months \$3,510, compounded until Dec. 31, 1912.....	3, 943. 83
Total.....	32, 364. 35

EXHIBIT M.—CHICAGO NO. 1.

Inventory.

PROPERTY OF CHICAGO POSTAL PNEUMATIC TUBE CO., FEB. 27, 1913.

	Year installed.	Cost.	Condition.
SHOP EQUIPMENT.			
1 drill press.....			Poor.
1 motor grinder			Do.
1 lathe.....			Do.
Soldering apparatus.....	1911	\$50. 00	Good.
Miscellaneous tools.....		150. 00	Fair.
Carrier parts.....		50. 00	New.
Machine parts, etc.....			
Shop motor, and panel, benches, racks, etc	1911	300. 00	Good.
STREET EQUIPMENT.			
Force pump.....	1905		Fair.
Rods.....	1911	50. 00	Good.
Miscellaneous drills.....	1911	10. 00	Do.
Picks.....	1911	50. 00	Do.
Shovels, etc., for street work.....	1911	175. 00	Fair.
Spare bends.....			
Closures, etc.....		1, 440. 00	
Emergency Dutchman.....	1907		Good.
GENERAL POST OFFICE TERMINALS.			
3 sluice gate open receivers, Nos. 227, 239, 243.....	1904	2, 400. 00	Good.
3 gravity transmitters, Nos. 226, 238, 242.....	{ ¹ 1911 ² 1910	1, 875. 00	Do.
1 motor-driven time lock, No. 288.....	1912	75. 00	Do.
POWER PLANT, CANAL STATION.			
1 50-horsepower direct-connected motor-driven Connorsville blower, No. 266.	1911	3, 000. 00	Good.
1 75-horsepower direct-connected motor-driven Laidlaw Dunn Gordon compressor, No. 265.	1911	5, 000. 00	Do.
2 switch panels, Nos. 267, 305	1911	600. 00	Do.
1 receiver tank, No. 264.....	1911		Do.
ILLINOIS CENTRAL STATION TERMINAL.			
2 sluice-gate closed receivers, Nos. 245, 255.....	1904	2, 700. 00	Good.
2 gravity transmitters, Nos. 244, 254.....	1910	1, 250. 00	Do.
1 motor-driven time lock, No. 287.....	1912	75. 00	Do.
TWENTIETH STREET STATION TERMINALS.			
1 sluice-gate closed receiver, No. 257	1911	1, 350. 00	Good.
1 gravity transmitter, No. 256	1911	625. 00	Do.

¹ Two.

² One.

Inventory—Continued.

PROPERTY OF CHICAGO POSTAL PNEUMATIC TUBE CO., FEB. 27, 1913—Continued.

	Year installed.	Cost.	Condition.
ARMOUR STATION TERMINALS.			
2 revolving-valve open receivers, Nos. 249, 253.....	1908	\$1,600.00	Good.
2 gravity transmitters, Nos. 248, 252.....	1908	1,250.00	Do.
POWER PLANT, GENERAL POST OFFICE, LINE.			
3 Laidlaw Dunn Gordon duplex belt-driven compressors, Nos. 273, 274, 275.	1904	6,700.00	Need re- pairs, etc.
3 90-horsepower General Electric motors, Nos. 276, 277, 278.....	{ ¹ 1904 ² 1908 }	3,300.00	Good.
1 remote-control panel board.....		50.00	Fair.
3 standard panel boards.....	1910	900.00	Good.
2 receiver tanks.....	1904	200.00	Do.
1 Reliance ammeter, scale 0 to 50.....			First class.
Foregoing panel mounted on angle-iron legs.....			Do.
Piping, basement, 6 extension-service stubs capped for service.....			Do.
Valves:			
Thirteen 8½ Crane gate valves.....			Good.
One 4-inch Crane gate valve.....			Do.
1 safety valve.....			Do.
One 8½-inch check valve.....			Do.
1 receiver tank, tube company's No. 264.....			Do.
Air time lock:			
1 transmitter air time lock, tube company's No. 296, inclosed in wooden case with glass door.			Do.
1 one-thirtieth horsepower, General Electric, direct-current shunt motor, No. 67166, speed, 1,700 revolutions per minute.			Do.
1 iron Cutler-Hammer controller, 220 ohm, 0.75 ampere capacity..			Do.

MAIN OFFICE.

2 Crosby indicators.....			Good.
Bushnell reducing motion, complete.....			Do.
New pulley and guide for string needed, estimated value \$70.....			Do.
Fifty-four 12-foot lengths 8-½-in. cast-iron pipe (in storage at Armour station).		\$1,065.90	

CANAL STATION.

1 Pratt & Whitney 12-inch sweep lathe.....			Poor.
1 No. 19 Fay drill press.....			Do.
1 Hanson & Van Winkel emery grinder and buffer.....			Do.
1 main countershaft, length 22 feet 2 inches, diameter 2 inches.....			Do.
3 individual countershafts, length 4 feet, 1 inch diameter.....			Fair.
1 pulley, wooden, size 35¾ inches, 1½-inch bore.....			Do.
1 pulley, wooden, size 17¾ inches, 1½-inch bore.....			Do.
1 pulley, wooden, size 7-inches, 1½-inch bore.....			Do.
1 pulley, wooden, size 6 inches, 1½-inch bore.....			Do.
1 pulley, iron, size 5¾ inches, 1½-inch bore.....			Do.
1 pulley, iron, size 9¾ inches, 1-inch bore.....			Do.
1 pulley, iron, size 7¾ inches, 1-inch bore.....			Do.
1 pulley, iron, size 5¼ inches, ¾-inch bore.....			Do.
1 differential pulley, iron, size 9¾ inches, 1½-inch bore.....			Do.
1 iron reversing pulley, size 10 inches, 1½-inch bore.....			Do.
1 iron pulley, size 10 inches, 1½-inch bore.....			Do.
1 wooden pulley, size 16 inches, 1½-inch bore.....			Do.
1 wooden pulley, size 7¾ inches, bore 1½ inches.....			Do.
1 iron pulley, size 7¾ inches, bore 1½ inches.....			Do.
Belts:			
2 leather belts 14 feet by 1½ inches.....			
1 leather belt 17 feet 4 inches by 3¾ inches.....			
1 canvas belt 27 feet 8 inches by 4 inches.....			
Motor:			
One 5-horsepower General Electric form A shunt motor, 220-volt, 19 amperes, speed 1,100, tube company's No. 307.			First class.
1 slate panel board for above motor 12 by 30 inches by ¾-inch diam- eter.			Do.
One 40-ampere 2-pole knife switch.....			Do.
Two 50-ampere fuses.....			Do.

¹ Two.

² One.

Inventory—Continued.

GENERAL POST OFFICE.

	Year installed.	Cost.	Condition.
POWER PLANT.			
1 75-horsepower Laidlaw-Dunn-Gordon duplex steam compressor, No. 272.	1904	\$4,000.00	Needs re-
3 75-horsepower Rand Drill Co. duplex steam compressors, Nos. 269, 270, 271.	1904	12,000.00	pairs. Do.
1 ventilating engine, No. 268.	1904	-----	Fair.
1 panel board.	1904	50.00	Good.
3 receiver tanks.	1904	300.00	Do.
KINZIE STREET STATION TERMINALS.			
1 revolving-valve closed receiver, No. 241.	1912	1,350.00	Good.
1 gravity transmitter, No. 240.	1910	625.00	Do.
LA SALLE STREET STATION TERMINALS.			
2 sluice-gate closed receivers, Nos. 229, 237.	1904	2,700.00	Fair.
2 gravity transmitters, Nos. 228, 236.	1910	1,250.00	Good.
1 motor time lock, No. 289.	1912	75.00	Do.
STATION U TERMINALS.			
2 revolving-valve closed receivers, Nos. 231, 235.	1911	2,700.00	Good.
2 gravity transmitters, Nos. 230, 234.	1911	1,250.00	Do.
1 motor time lock, No. 285.	1912	75.00	Do.
CANAL STREET STATION TERMINALS.			
1 transmitter, No. 232.	1911	625.00	Good.
1 revolving-valve open receiver, No. 233.	1911	800.00	Do.
1 motor-driven time lock, No. 286.	1912	75.00	Do.
STOCK YARDS STATION TERMINALS.			
1 sluice gate closed receiver, No. 251.	1908	1,350.00	(¹). Fair.
1 gravity transmitter, No. 250.	1904	625.00	
HARRISON STREET TUNNEL.			
1 motor property of telephone company but claimed by tube company.	1910	125.00	Fair.
1 pump.	1906	-----	Poor.
CANAL STATION.			
1 spare transmitter.	-----	625.00	Good.
1 revolving valve open receiver, spare.	-----	1,350.00	Do.
ARMOUR STATION.			
1 spare open receiver.	-----	800.00	
1 spare transmitter.	-----	625.00	
HYDRAULIC ENGINEERING WORKS.			
1 revolving closed receiver, no table (stored).	-----	1,350.00	Good.
GENERAL POST OFFICE.			
Spare sections, enough of gravity transmitter to make up 3.	-----	1,875.00	
Miscellaneous parts for open and closed receivers.	-----	500.00	
Estimated cost of tools in engine rooms and terminal rooms.	-----	457.59	
Length of tubing in use 19.2034 miles.	1903-4	167,300.02	Fair.
Street vaults, 80.	(²)	-----	Good.
Bends, 115 pairs, i. e., 231 sets.	-----	14,291.00	
Closures, 29.	-----	-----	
Drips, 79.	-----	-----	Inopera-
Dutchmen, 1.	-----	-----	tive. Good.
Number of carriers, 450 per set.	1911-12	9,750.00	Poor.

¹ Fair; casting cracked.² 1903-1911, inclusive.

Total, 975.

NOTE.—Necessary air piping, auxiliary piping, wiring tools, etc., included with equipment.

EXHIBIT N, CHICAGO NO. 2.

Interruption and suspension of tube service in line to and from the general post office and La Salle Street tube station from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
Jan. 17, 1912	11.31 a. m. to 11.45 a. m.	Defective transmitter at La Salle Street tube station.
Jan. 24, 1912	3.38 p. m. to 10.17 p. m.	Open carrier.
Jan. 25, 1912	9.56 a. m. to 11.50 a. m.	Do.
Mar. 16, 1912	4.20 p. m. to 4.26 p. m.	Unknown.
Mar. 19, 1912	11.32 p. m. to 1 a. m. Mar. 20	Do.
Apr. 6, 1912	8.28 p. m. to 8.40 p. m.	Block at Canal station.
Apr. 17, 1912	4.21 p. m. to 4.55 p. m.	Unknown.
Apr. 19, 1912	8.20 a. m. to 8.45 a. m.	Do.
June 12, 1912	5.30 a. m. to 5.34 a. m.	Do.
July 10, 1912	3.12 p. m. to 3.24 p. m.	Do.
July 11, 1912	9.50 a. m. to 1.57 p. m.	Do.
July 12, 1912	6.40 p. m. to 8.57 p. m.	Do.
July 18, 1912	7.58 p. m. to 9.24 p. m.	Do.
July 20, 1912	11.24 p. m. to 11.55 p. m.	Open carrier.
July 23, 1912	4.05 p. m. to 4.41 p. m.	Unknown.
July 24, 1912	6.31 p. m. to 1 a. m. July 25	Do.
July 25, 1912	2.07 p. m. to 2.13 p. m.	Do.
July 31, 1912	10.42 p. m. to 10.50 p. m.	Do.
Aug. 6, 1912	5.53 p. m. to 6.25 p. m.	Do.
Do.	7.50 p. m. to 8.25 p. m.	Do.
Aug. 20, 1912	6.04 p. m. to 6.31 p. m.	Open carrier.
Aug. 24, 1912	5.48 p. m. to 6.48 p. m.	Unknown.
Sept. 6, 1912	4.20 p. m. to 6.12 p. m.	Do.
Sept. 18, 1912	1.18 p. m. to 2.07 p. m.	Do.
Sept. 26, 1912	6.10 p. m. to 6.51 p. m.	Do.
Sept. 27, 1912	3.14 p. m. to 3.35 p. m.	Do.
Sept. 30, 1912	4.55 p. m. to 5.38 p. m.	Open carrier.
Oct. 5, 1912	3.42 p. m. to 4.30 p. m.	Unknown.
Oct. 12, 1912	6.57 p. m. to 7.15 p. m.	Open carrier.
Oct. 18, 1912	8.47 p. m. to 9.14 p. m.	Unknown.
Oct. 19, 1912	1.24 a. m. to 1 a. m. Oct. 20.	Block in line.
Oct. 22, 1912	12.10 p. m. to 1.04 p. m.	Unknown.
Do.	5.33 p. m. to 6 p. m.	Do.
Oct. 24, 1912	10.42 a. m. to 11.05 a. m.	Do.
Oct. 30, 1912	10.45 p. m. to 1 a. m. Oct. 31.	Do.
Oct. 31, 1912	2.57 p. m. to 1 a. m. Nov. 1.	Block in line.
Nov. 1, 1912	5 a. m. to 1 a. m., Nov. 2.	Do.
Nov. 2, 1912	5 a. m. to 1 a. m., Nov. 3.	Do.
Nov. 4, 1912	5 a. m. to 6.15 a. m.	Do.
Nov. 5, 1912	8.37 a. m. to 10.16 a. m.	Unknown.
Nov. 8, 1912	11.51 a. m. to 1.18 p. m.	Do.
Nov. 11, 1912	6.10 a. m. to 7.48 a. m.	Do.
Nov. 27, 1912	7.48 a. m. to 7.52 p. m.	Do.
Do.	8.17 p. m. to 1 a. m., Nov. 28.	Block in line.
Nov. 28, 1912	5 a. m. to 11.31 p. m.	Unknown.
Dec. 7, 1912	2.35 p. m. to 2.52 p. m.	Do.
Dec. 9, 1912	12.43 p. m. to 1 p. m.	Do.
Dec. 11, 1912	5.26 p. m. to 6.01 p. m.	Do.
Dec. 18, 1912	8.50 p. m. to 9.30 p. m.	Do.
Dec. 21, 1912	11.12 a. m. to 3.32 p. m.	Do.
Dec. 23, 1912	5.45 p. m. to 8.05 p. m.	Do.
Do.	10.47 p. m. to 10.49 p. m.	Do.
Dec. 25, 1912	6.05 p. m. to 9.11 p. m.	Do.
Dec. 30, 1912	10.22 a. m. to 11.24 a. m.	Do.

Interruption and suspension of tube service in line to and from the La Salle Street and Union tube stations from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
Jan. 17, 1912	11.05 a. m. to 11.45 a. m.	Defective transmitter at La Salle Street tube station.
Jan. 18, 1912	9.04 a. m. to 9.07 a. m.	Unknown.
Jan. 24, 1912	3.38 p. m. to 1 a. m., Jan. 25.	Open carrier.
Jan. 25, 1912	5 a. m. to 11.50 a. m.	Do.
Feb. 11, 1912	10.55 a. m. to 11.10 a. m.	Unknown.
Mar. 16, 1912	4.15 p. m. to 4.27 p. m.	Do.
Mar. 19, 1912	11.15 p. m. to 1 a. m., Mar. 20.	Do.
Apr. 6, 1912	8.28 p. m. to 8.40 p. m.	Block at Canal Station.
Apr. 17, 1912	4.16 p. m. to 4.56 p. m.	Unknown.
Apr. 19, 1912	8.20 a. m. to 8.45 a. m.	Do.

Interruption and suspension of tube service in line to and from the La Salle Street and Union tube stations from Jan. 1 to Dec. 31, 1912—Continued.

Date.	Time.	Cause.
July 10, 1912	3.12 p. m. to 3.24 p. m.	Unknown.
July 11, 1912	9.35 a. m. to 1.57 p. m.	Do.
July 12, 1912	6.40 p. m. to 8.57 p. m.	Do.
July 18, 1912	7.54 p. m. to 9.28 p. m.	Do.
July 20, 1912	11.15 p. m. to 11.58 p. m.	Open carrier.
July 23, 1912	4.05 p. m. to 4.40 p. m.	Unknown.
July 24, 1912	6.22 p. m. to 1 a. m., July 25.	Do.
July 31, 1912	10.42 p. m. to 10.50 p. m.	Do.
Aug. 6, 1912	5.52 p. m. to 6.25 p. m.	Do.
Do.	7.50 p. m. to 8.27 p. m.	Do.
Aug. 20, 1912	6.05 p. m. to 6.35 p. m.	Open carrier.
Aug. 24, 1912	5.40 p. m. to 6.48 p. m.	Unknown.
Sept. 6, 1912	4.20 p. m. to 6.12 p. m.	Do.
Sept. 17, 1912	8.45 p. m. to 9.05 p. m.	Do.
Sept. 18, 1912	1.20 p. m. to 2.07 p. m.	Do.
Sept. 19, 1912	2.45 p. m. to 3 p. m.	Do.
Sept. 20, 1912	8.20 a. m. to 8.37 a. m.	Do.
Sept. 26, 1912	6.20 p. m. to 6.51 p. m.	Do.
Sept. 27, 1912	3.14 p. m. to 3.35 p. m.	Do.
Sept. 30, 1912	4.35 p. m. to 5.37 p. m.	Open carrier.
Oct. 4, 1912	9.45 p. m. to 9.52 p. m.	Unknown.
Oct. 5, 1912	3.35 p. m. to 4.30 p. m.	Do.
Oct. 11, 1912	7.12 a. m. to 7.25 a. m.	Do.
Oct. 16, 1912	5.00 a. m. to 5.32 a. m.	Do.
Oct. 18, 1912	8.47 p. m. to 9.14 p. m.	Do.
Oct. 19, 1912	5.25 a. m. to 5.43 a. m.	Do.
Do.	7.25 a. m. to 1 a. m., Oct. 20.	Block in line.
Oct. 22, 1912	10.15 a. m. to 10.22 a. m.	Unknown.
Do.	12.10 p. m. to 1.04 p. m.	Do.
Do.	5.33 p. m. to 6 p. m.	Do.
Oct. 23, 1912	3.25 p. m. to 3.48 p. m.	Do.
Oct. 24, 1912	10.42 a. m. to 11.05 a. m.	Do.
Oct. 30, 1912	10.45 p. m. to 1 a. m., Oct. 31.	Do.
Oct. 31, 1912	2.57 p. m. to 1 a. m., Nov. 1.	Block in line.
Nov. 1, 1912	5 a. m. to 1 a. m., Nov. 2.	Do.
Nov. 2, 1912	5 a. m. to 1 a. m., Nov. 3.	Do.
Nov. 4, 1912	5 a. m. to 6.15 a. m.	Do.
Nov. 5, 1912	8.37 a. m. to 10.16 a. m.	Unknown.
Nov. 8, 1912	11.45 a. m. to 1.19 p. m.	Do.
Nov. 11, 1912	6.10 p. m. to 8.40 p. m.	Do.
Nov. 22, 1912	8.02 a. m. to 8.10 a. m.	Do.
Nov. 27, 1912	7.48 p. m. to 7.52 p. m.	Do.
Do.	8.17 p. m. to 1 a. m., Nov. 28.	Block in line.
Nov. 28, 1912	5 a. m. to 11.31 p. m.	Unknown.
Dec. 3, 1912	11.25 p. m. to 11.47 p. m.	Do.
Dec. 7, 1912	2.33 p. m. to 2.55 p. m.	Do.
Dec. 9, 1912	12.43 p. m. to 1 p. m.	Do.
Dec. 11, 1912	5.20 p. m. to 6.07 p. m.	Do.
Dec. 18, 1912	8.30 p. m. to 9.30 p. m.	Do.
Dec. 21, 1912	11.09 a. m. to 3.31 p. m.	Do.
Dec. 23, 1912	3.47 p. m. to 4 p. m.	Do.
Do.	5.40 p. m. to 8.03 p. m.	Do.
Dec. 26, 1912	5.50 p. m. to 9.15 p. m.	Do.
Dec. 27, 1912	2.43 p. m. to 2.56 p. m.	Do.
Dec. 30, 1912	10.20 a. m. to 11.24 a. m.	Do.

Interruption and suspension of tube service in line to and from the Union and Canal tube station from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
Jan. 24, 1912	3.38 p. m. to 1 a. m. Jan. 25	Open carrier.
Jan. 25, 1912	5 a. m. to 11.50 a. m.	Do.
Feb. 21, 1912	4.32 p. m. to 4.58 p. m.	Unknown.
Mar. 7, 1912	11.21 p. m. to 11.38 p. m.	Do.
Mar. 16, 1912	4.32 p. m. to 4.28 p. m.	Do.
Mar. 19, 1912	11.25 p. m. to 1 a. m. Mar. 20	Do.
Apr. 2, 1912	5.50 p. m. to 10.35 p. m.	Do.
Apr. 6, 1912	8.28 p. m. to 8.40 p. m.	Block at Canal Station.
Apr. 17, 1912	4.24 p. m. to 4.56 p. m.	Unknown.
Apr. 19, 1912	8.20 a. m. to 8.45 a. m.	Do.
July 11, 1912	10.15 a. m. to 1.57 p. m.	Do.
July 12, 1912	6.40 p. m. to 8.57 p. m.	Do.
July 15, 1912	4.19 p. m. to 4.30 p. m.	Do.
July 18, 1912	7.55 p. m. to 9.23 p. m.	Do.

Interruption and suspension of tube service in line to and from the Union and Canal tube station from Jan. 1 to Dec. 31, 1912—Continued.

Date.	Time.	Cause.
July 20, 1912	11.06 p. m. to 11.55 p. m.....	Open carrier.
July 23, 1912	4.10 p. m. to 4.40 p. m.....	Unknown.
July 24, 1912	6.22 p. m. to 1 a. m. July 25	Do.
Aug. 6, 1912	5.45 p. m. to 6.25 p. m.....	Do.
Do.....	7.48 p. m. to 8.26 p. m.....	Do.
Aug. 20, 1912	6.05 p. m. to 6.35 p. m.....	Open carrier.
Aug. 24, 1912	5.41 p. m. to 6.47 p. m.....	Unknown.
Sept. 6, 1912	4.23 p. m. to 6.13 p. m.....	Do.
Sept. 17, 1912	8.45 p. m. to 9.05 p. m.....	Do.
Sept. 18, 1912	1.50 p. m. to 2.07 p. m.....	Do.
Sept. 20, 1912	8.15 a. m. to 8.37 a. m.....	Do.
Do.....	4.03 p. m. to 5.12 p. m.....	Do.
Sept. 26, 1912	4.53 p. m. to 5.05 p. m.....	Do.
Do.....	6.12 p. m. to 6.52 p. m.....	Do.
Sept. 27, 1912	3 p. m. to 3.35 p. m.....	Do.
Sept. 30, 1912	4.40 p. m. to 5.37 p. m.....	Open carrier.
Oct. 4, 1912	9.45 p. m. to 9.57 p. m.....	Unknown.
Oct. 5, 1912	3.38 p. m. to 4.30 p. m.....	Do.
Oct. 11, 1912	7.12 a. m. to 7.25 a. m.....	Do.
Oct. 16, 1912	5.05 a. m. to 5.32 a. m.....	Do.
Oct. 18, 1912	8.53 p. m. to 9.12 p. m.....	Do.
Oct. 19, 1912	7.24 a. m. to 1 a. m. Oct. 20	Block in line.
Oct. 22, 1912	10.15 a. m. to 10.22 a. m.....	Unknown.
Do.....	12.10 p. m. to 1.04 p. m.....	Do.
Do.....	5.35 p. m. to 6 p. m.....	Do.
Oct. 23, 1912	3.20 p. m. to 3.46 p. m.....	Do.
Oct. 24, 1912	10.45 a. m. to 11.07 a. m.....	Do.
Oct. 30, 1912	10.45 p. m. to 1 a. m. Oct. 31	Do.
Oct. 31, 1912	2.57 p. m. to 1 a. m. Nov. 1	Block in line.
Nov. 1, 1912	5 a. m. to 1 a. m. Nov. 2	Do.
Nov. 2, 1912	5 a. m. to 1 a. m. Nov. 3	Do.
Nov. 4, 1912	5 a. m. to 6.15 a. m.....	Do.
Nov. 5, 1912	8.33 a. m. to 10.04 a. m.....	Unknown.
Nov. 8, 1912	11.46 a. m. to 1.17 p. m.....	Do.
Nov. 11, 1912	6.03 p. m. to 8.48 p. m.....	Do.
Nov. 14, 1912	10.16 p. m. to 10.37 p. m.....	Do.
Nov. 22, 1912	8.02 a. m. to 8.10 a. m.....	Do.
Nov. 27, 1912	8.17 p. m. to 1 a. m. Nov. 28	Block in line.
Nov. 28, 1912	5 a. m. to 11.31 p. m.....	Unknown.
Dec. 7, 1912	2.43 p. m. to 2.55 p. m.....	Do.
Dec. 9, 1912	12.43 p. m. to 1 p. m.....	Do.
Dec. 11, 1912	5.15 p. m. to 6.05 p. m.....	Do.
Dec. 18, 1912	7.35 p. m. to 9.30 p. m.....	Do.
Dec. 21, 1912	11.12 a. m. to 3.32 p. m.....	Do.
Dec. 23, 1912	3.42 p. m. to 4 p. m.....	Do.
Do.....	6 p. m. to 8 p. m.....	Do.
Dec. 26, 1912	5.50 p. m. to 9.12 p. m.....	Do.
Dec. 30, 1912	10.15 a. m. to 11.24 a. m.....	Do.

Interruption and suspension of tube service in line to and from the general post office and Kinzie tube station from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
Oct. 30, 1912	3.30 p. m. to 3.50 p. m.....	Unknown.
Nov. 4, 1912	1.35 p. m. to 1 a. m., Nov. 5.....	Block in line caused by débris from old Chicago & North Western depot, which was being wrecked, falling, thereby causing a break in the line.
Nov. 5, 1912	5 a. m. to 10.10 a. m.....	Do.
Dec. 4, 1912	12.45 p. m. to 10.45 p. m.....	Unknown.

Interruption and suspension of tube service in line to and from the general post office and Illinois Central tube station from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
July 25, 1912	5.29 p. m. to 5.45 p. m.....	Unknown.
July 30, 1912	6.41 p. m. to 7.45 p. m.....	Do.
Aug. 10, 1912	7.44 a. m. to 1 a. m., Aug. 11.....	Line depressed and broken in State Street at a point near Jackson Boulevard, caused by erection of a new building.
Aug. 12, 1912	5 a. m. to 1 a. m., Aug 13.....	Do.
Aug. 14, 1912	5 a. m. to 1 a. m., Aug. 15.....	Do.
Aug. 15, 1912	5 a. m. to 1 a. m., Aug. 16.....	Do.
Aug. 16, 1912	5 a. m. to 1 a. m., Aug. 17.....	Do.
Aug. 17, 1912	5 a. m. to 4 p. m.....	Do.
Sept. 27, 1912	4.05 p. m. to 4.21 p. m.....	Unknown.
Oct. 7, 1912	6.15 p. m. to 7.55 p. m.....	Do.
Oct. 22, 1912	6.10 p. m. to 6.22 p. m.....	Do.
Nov. 5, 1912	11.20 p. m. to 11.41 p. m.....	Do.
Nov. 9, 1912	3.55 p. m. to 4.47 p. m.....	Do.

Interruption and suspension of tube service in line to and from the Illinois Central, Twentieth Street Station, Armour and Stock Yards Stations from Jan. 1 to Dec. 31, 1912.

Date.	Time.	Cause.
Jan. 10, 1912	11 a. m. to 9 p. m..... <i>Between Armour and Stock Yards Stations.</i>	Defective joint in line.
Jan. 11, 1912	5 a. m. to 1.32 p. m.....	Block in line.
June 29, 1912	12.02 p. m. to 12.47 p. m.....	Unknown.
Aug. 16, 1912	8.15 p. m. to 9 p. m.....	Do.
Sept. 5, 1912	8.48 a. m. to 9.25 a. m.....	Do.
Oct. 21, 1912	4.05 p. m. to 4.25 p. m.....	Do.

BOSTON, MASS., *March 18, 1913.*

Mr. ALFRED BROOKS FRY,
Consulting Engineer, 727 Customhouse Building, New York City.

DEAR SIR: I have your letter of March 17, referring to our previous correspondence in the matter of interruptions to the postal pneumatic-tube service in our Chicago system, etc.

I note that you have received a letter from the postmaster of Chicago which gives his reason for the form of report sent to me on February 24 last for comment. I trust that my reply to you under date of February 26 fully explained the fact that the Chicago reports are made on a different basis than are those made in Boston, Brooklyn, New York, and St. Louis. As I there stated, it would seem, provided that a comparison is to be made under this subject between the different cities, that either the reports in Chicago should be made out as the reports are in the other cities, or that the reports in the other cities should be put on the same basis as are the Chicago reports.

I also acknowledge your request that in connection with the 84 stoppages in the Chicago system during the calendar year of 1912, I fill out a sheet which you inclosed, the headings on this sheet being a separation of the different causes of trouble to this pneumatic-tube system during the year; and in this connection I note your statement that the postmaster in his reply to your letter did not give you this information, and therefore you are writing to me for it.

This information is available in my office, and I shall be very glad to put it at your disposal. As a matter of fact, however, and as I think I indicated in my letter of February 26, a formal report is made to the Chicago post office in connection with all these accidents, and wherever possible the reason for the accident is given. In other words, the Chicago post office has received from us the same information that has been furnished under similar conditions to the post offices at Boston, Brooklyn, New York, and St. Louis. I suggest, therefore, that this information might have more weight with you if it were secured from the Chicago post office instead of from this company. If, however, it is impracticable because of lack of time to get this information from this source, I know that if you will consult with Mr. B. C. Batcheller, the chief engineer of our company, he can give you some material aid on this question.

I assume from the correspondence which I have had with you, and also from the talk which I recently had with you, that you are finding it difficult to reconcile the reports

of the interruptions to service in Chicago with the reports of similar kind in the other cities, since the apparent large number of interruptions per mile in Chicago during the year in no way checks up with the records in these other cities. I endeavored to explain the reason for this in my letter of February 26, but now wish to go into the matter in further detail.

You will perhaps remember that of the 84 interruptions during the year 51, or approximately 61 per cent, occurred in the months of September, October, November, and December. In my letter of February 26 I explained that during this period the Chicago system was particularly unfortunate in what we call "line troubles" or broken tubes in the streets. These troubles in every instance were due to causes entirely beyond the company's control. They not only resulted in serious delays and difficulties in operating the service, but, as must be apparent, during this period the carriers had to be forced through these tubes, and the carriers were therefore subject to considerable abuse. The result of this is clearly shown by the fact that out of the 84 interruptions 30 of them, or approximately 36 per cent, were due to carrier troubles. Now, this same type carrier has been used during this period by the systems in Boston, Brooklyn, New York, and Philadelphia. The fact that these systems did not have similar trouble makes me believe that the cause of Chicago's poor record, while due apparently to defects in carriers, was due primarily to the abuse which these carriers got in going through defective tubes.

These tubes have now been removed from the Chicago system, as is indicated by our record since the first of the year. During this period there has been but one serious trouble, i. e., from 10.45 p. m. on March 10 to 6 p. m. on March 11. This trouble was on the line between general post office and La Salle Station. It was caused by the carelessness of one of our employees, who dispatched an open carrier. This employee was immediately discharged. The following carrier wedged on the mail and it was necessary to dig up the tube. The carrier happened to be stuck on Jackson Boulevard, which is under the control of the park commission. The park commission refused to allow our employees to start digging until 7.45 a. m., March 11. This fact accounts for the length of delay.

If there is any other information which I can give you which will be of assistance to you in connection with this question, I shall be very glad if you will write to me.

Respectfully,

AMERICAN PNEUMATIC SERVICE CO.,
M. L. EMERSON, *Manager*.

UNITED STATES POST OFFICE,
OFFICE OF SUPERINTENDENT OF MAILS,
Chicago, Ill., March 5, 1913.

MR. ALFRED BROOKS FRY,
Consulting Engineer,
Customhouse Building, New York, N. Y.

SIR: This office has the honor to acknowledge the receipt of your communication of February 27, inclosing letter from the manager of the American Pneumatic Service Co., under date of February 26, in regard to the interruption of tube service in the Chicago lines, which letter is in reply to one you addressed to him on February 24, pointing out that the number of stoppages in the Chicago tube system greatly exceeded those of any other city; also that in about 75 per cent of the stoppages the cause is given as unknown; and, further, that there were a considerable number of open carriers and more than the average number of interruptions in December last. For additional information in this matter, you state that you are transmitting a duplicate of the report made by the postmaster at New York City on stoppages in the pneumatic-tube system in that city during 1912, and that the form which he uses is substantially the form which is used in Philadelphia, Boston, and St. Louis as well.

In compliance with your request that consideration be given the statements made in the letter referred to, of the manager of the American Pneumatic Service Co., and that it be returned to you with such comment as is deemed proper, you are respectfully advised that in so far as the practice of this office in reporting the cause of certain failures as unknown is concerned it is due to suggestion made by Mr. M. L. Emerson, operating manager of the Chicago Postal Pneumatic Tube Co. Inasmuch as this suggestion did not appear to be unreasonable, it was deemed advisable to adopt the practice of reporting the cause as unknown, and, when reports were made to the department, to submit the papers which embodied the facts developed in course of investigation for the purpose of ascertaining the cause and thereby allow the department to be the judge of the merits of each case.

Relative to the matter of the proportion of stoppages in Chicago being seemingly greatly in excess of those in the other cities enumerated, you are respectfully advised that this office is not familiar with the systems in operation in those cities, but is

inclined to believe that this excess in all probability is due to the manner of reporting the stoppages, as illustrated in the letter you submit from the manager of the American Pneumatic Service Co. This office believes its methods in this particular are founded on an equitable basis, as route 535004 in operation here is composed of three branches leading from the main office. Two of these branches supply a number of railroad depots and stations.

For instance, the branch leaving the main office, running to La Salle Station, continues to Union tube station, and from thence to Canal Station. When the service between the main office and La Salle Station is suspended it is likewise suspended between La Salle and Union tube stations, and between this latter station and Canal Station. Should a suspension occur between Union tube station and Canal Station, which is the last link on this line, service would be discontinued on the other two links of this line—between the main office and La Salle Station, and between La Salle and Union tube stations. In this event the stoppage of service on the first link indicated would be reported as one item. Hence, when the service on one link of the line is suspended, and all the other links are shut down on its account, they are reported as separate items.

In the case of the line from the main post office to Illinois Central, Twentieth Street, Armour, and Stock Yards Stations, service may be stopped between the main post office and Illinois Central Station, and the mail be transported by wagon, while the service will continue in operation between the other stations enumerated on this line. In cases of this kind the stoppage is reported as between the main post office and the Illinois Central Station only. In like manner, service may be suspended between the Illinois Central Station and other stations south along this line, while the service between the main post office and Illinois Central Station is in operation. In instances of this kind the suspension is reported between each connecting station as a separate item. The reason why service continues between these stations is due to the fact that the company has an independent power house located at the Armour Station, which operates the service between the Illinois Central and Stock Yards Stations, independently of the power derived from the main office, operating branch between main office and Illinois Central Station.

The underlying idea in reporting each link of the service suspended as a separate item is for the purpose of enabling the department to more equitably adjust fines imposed on the company corresponding to the measure of their delinquency in the performance of service.

In cases of suspension of service covering one or more days, each day's suspension is reported for the reason that the company is under contract to supply 24 hours' service each day; and to report a suspension covering more than one day as one item would be likely to result in erroneous deductions for the reason that the 4 hours' suspension to which they are entitled out of the 24 would be included.

Respectfully,

D. A. CAMPBELL, *Postmaster.*

BOSTON, MASS., *February 26, 1913.*

ALFRED BROOKS FRY,

Consulting Engineer, Customhouse Building, New York City.

MY DEAR SIR: I thank you for your letter of February 24, and for the report of interruptions and suspensions of tube service in the various Chicago lines from January 1 to December 31, 1912, which you sent me therewith for my comment and explanation.

You state that there are two things about the report which seem to you unusual; first, in reference to the interruptions, that in about 75 per cent of the cases the cause is given as "unknown"; that there appears to be a considerable number of open carriers, and that there seems to be more than an average number of interruptions in December; and secondly, that the proportion of stoppages in Chicago seems greatly in excess of those in any other city.

Let me comment on your second statement first. We, of course, keep a very complete record of all interruptions to our service. I have therefore compared your tabulation of stoppages with these records, and find that they very closely agree in each instance except in Chicago. In that city your list gives 204 stoppages, whereas our records show 84. These delays are spread over the year as follows: January, 4; February, 2; March, 3; April, 4; May, none; June, 2; July, 12; August, 6; September, 12; October, 14; November, 11; December, 14.

The apparent large number of stoppages in Chicago as shown on your list, and the differences between our records and those given you by the post office, are explained as follows: The Chicago post office has a method different from that used in Boston, New York, Philadelphia, and St. Louis for tabulating this data. As a result this data can not be compared until it has been adjusted.

The Chicago method is as follows, and can best be explained by an example. The Chicago general post office furnishes power for the pneumatic tube between general post office and Canal Station via La Salle Station and Union Station. If a carrier sticks between general post office and La Salle Station, tube service is necessarily discontinued as far as Canal Station. In all cities but Chicago such an accident is stated as one suspension, which resulted in delays to pneumatic-tube service at certain mentioned stations. In Chicago this accident is stated as three interruptions—one between general post office and La Salle Station, one between La Salle Station and Station U, and one between Station U and Canal Station. Again, if this same suspension lasts over parts of two days, say from 11 p. m. on one day to 6 a. m. on the following day, this single accident by the Chicago method is called three interruptions for each day, or six interruptions in all; whereas by the method used in the other cities it would be stated as one accident and interruption.

In this connection you may be interested to know that the company is required to make a formal report to the Chicago post office for all such accidents. In such reports we invariably explain that the several separate instances of stoppage stated by the post office refer to one interruption only.

In order to make this point as clear as possible let me quote from the report which you sent to me and which I am returning herewith, as you requested.

On page 1 of the report it states, under date of March 16, that there was an interruption between general post office and La Salle Station from 4.20 to 4.26 p. m.; on page 4 it states that there was an interruption on the same date between La Salle Station and Station U from 4.15 to 4.27 p. m.; and on page 8 it states that there was an interruption between Station U and Canal Station on the same date from 4.22 to 4.28 p. m. These three items refer to one interruption only, which, according to our records, lasted for 12 minutes and was caused by a carrier sticking in the tube for some unknown reason.

Again, the pneumatic tube between these same points was interrupted from October 30 until November 3 because of a broken tube, which had to be removed from the line. This single accident, as you will note from the post-office records, is described as follows: As separate interruptions between general post office and La Salle Station on October 31, November 1, November 2, and November 4, and as separate interruptions between La Salle Station and Station U and Station U and Canal Station on the same dates. In other words, by the Chicago method of stating the data this single accident is stated as 12 interruptions.

Now let me comment on your first statement: Your first point is that in about 75 per cent of the stoppages the Chicago post office gives the cause as "unknown." I mentioned above the fact that in the case of all accidents we make a formal report to the post office. This report in practically every instance gives the cause of the accident. The post office have apparently given you a copy of their own preliminary report and have not noted therein the cause of the accident as later stated to them by us. Mr. Batcheller has a summary giving in detail all the accidents in the Chicago system last year. He will be glad to go over this with you and to explain these different accidents.

In the matter of open carriers, the Chicago system had an unusual number last year. The cause of this was some defective steel which entered into certain carrier parts. All our steel is purchased on analysis. This steel, however, was not uniform. The Chicago system happened to be the first to get these parts, and was, therefore, the sufferer. All these parts were replaced as quickly as possible.

The Chicago system was also particularly unfortunate during the year in what we call line troubles, or broken tubes in the streets. Such troubles are very unusual, and are wholly a question of accident. These broken tubes also are often very difficult to find, and consequently the trouble may extend over a very considerable period of time. These major troubles were as follows:

On January 10 a new elevated road pier broke a tube. This accident was easily discovered and repaired.

On August 8 the sheathing of the new foundation for the Hub Building, on State Street, gave way. This resulted in the street caving in and all public-service structures being broken. The street was roped off, and continued to slide for several days. For this reason it was not possible to repair our tubes until August 14.

From October 19 to November 31 intermittent troubles of more or less seriousness were had with broken tubes on the La Salle line. At times these tubes simply damaged carriers, and at other times they blocked the line. It was found that a very serious water-main leak had undermined our tube for a considerable distance. This caused several tubes at different points to break. All of these tubes were finally found and removed and the line relaid. The water pipe, the water from which was escaping into the river, was repaired. This line is now, therefore, in good condition.

On November 10, and again on December 4, workmen engaged in demolishing the old Northwestern Railway Depot dropped walls or chimneys on our tube line, thereby causing breaks and delays in service.

All the accidents mentioned above are what might well be called extraordinary and unusual.

In reference to your statement that there appears to be a proportionately large number of stoppages in December, I find on analysis that of the 14 interruptions, most of them are of short duration and are due to carrier troubles. The carriers during October and November were subject to continual abuse because of the broken joints in the La Salle line, which were later discovered, and which are described above. These carrier troubles can undoubtedly be laid to this cause.

You state that as a matter of comparison between the different systems you have taken the stoppages per mile per year. It may interest you to know that we base our comparisons on the stoppages per line—or, in other words, per transmitter per year.

You also state Chicago to have a rather less mileage than Boston. This I presume is an error in transcribing.

I have answered your letter in considerable detail, and I hope that I have given you the information which you desire.

Respectfully,

AMERICAN PNEUMATIC SERVICE COMPANY,
M. L. EMERSON, *Manager*.

EXHIBIT O, CHICAGO NO. 3.

DETAILED REPORT ON POWER-GENERATING APPARATUS AND EQUIPMENT; ALSO ON
VAULTS, TUNNELS, ETC., CHICAGO POSTAL PNEUMATIC TUBE CO.

POWER-GENERATING APPARATUS.

There are three power plants, situated as follows: General Post Office Building, basement, Clark and Adams Streets; Canal Postal Station, basement, Washington and Canal Streets; Armour Postal Station, basement, Thirty-first Street and Indiana Avenue.

GENERAL POST OFFICE POWER PLANT.

Equipment.—Three 75-horsepower Rand Drill Co. duplex steam compressors; one 75-horsepower Laidlaw-Dunn-Gordon duplex steam compressor; three receiver tanks; one ventilating engine; one panel board.

Cards were taken on all four engines, both steam and air cylinders, and are submitted herewith. All of the eight compressor and six steam-cylinder heads were removed and cylinders calipered to determine amount of wear. (See test sheet "A"—engines.) The two steam-cylinder heads of the Laidlaw compressors were not removed, owing to the fact that the entire compressor end of the engine would have to be dismantled before heads would be accessible.

The following repairs are necessary in order to place engines in first-class condition, viz:

Hews & Philips 75-horsepower duplex steam engine, cylinders 10 inches by 18 inches, and Rand Drill Co. duplex air compressor, No. 1, cylinders, 20 inches by 26 inches, require—

- New crank pins and brasses.
- New guide shoes.
- New cross-head pins and brasses.
- New piston rods.
- New throttle valve.
- New expansion rings.
- Main bearings overhauled.
- Valve gearing lost motion taken up.
- Steam cylinders rebored.
- Compressor cylinders rebored.
- Eccentrics overhauled.
- New compressor valves in exhaust.
- Compressor valve's casing rebored.
- Oiling system overhauled.
- Steam-exhaust system overhauled.
- New steam-valve stems all around.
- New dash pots.

Many of the above-named parts now in use, with good care, will give service for some time to come.

Hews & Philips engine and Rand Drill Co., compressor No. 2 (No. 2582), cylinders, 10 inches by 18 inches and 20 inches by 26 inches, respectively, require—

- New crank pins and brasses.
- New guide shoes.
- New cross-head pins and brasses.
- New piston rods.
- New valve gearing and lost motion taken up.
- New throttle valve.
- New expansion rings, steam cylinders.
- Steam cylinders rebored.
- Eccentrics overhauled.
- Compressor cylinder rebored.
- New compressor-expansion rings.
- New valves in compressor exhaust.
- Compressor valve casing rebored.
- Oiling system overhauled.
- Steam-exhaust system overhauled.
- New valve stems all around.
- New dash pots.

With good care many of the above parts will give service for some time to come.

Hews & Philips engine, cylinders 10 inches by 18 inches, and Rand Drill Co. air compressor No. 3 (No. 2579), cylinders 20 inches by 26 inches, require—

- Low-pressure side-main bearing looked over.
- Low-pressure side-main shaft looked over.
- New crank pins and brasses.
- New guide shoes.
- New cross-head pins and brasses.
- New piston rods.
- New valve gearing.
- New throttle valve.
- New expansion rings.
- Steam cylinder rebored.
- Eccentrics overhauled.
- Compressor cylinder rebored.
- New compressor-expansion rings.
- New valves in exhaust.
- Valve casings rebored.
- Oiling system overhauled.
- New valve stems for compressors.
- New dash pots.

With good care many of the above-named parts will last for some time.

Laidlaw Dun Gordon Co. (No. 18302) duplex steam compressor No. 4, cylinders 11 inches by 18 inches and 24 inches by 24 inches, requires—

- Low-pressure side-main bearing looked over.
- New crank pins and brasses.
- New guide shoes.
- New cross-head, low-pressure side.
- New piston rod, high-pressure side.
- New cylinder, high-pressure side (cracked and patched in two places).
- New throttle valve.
- New expansion rings.
- New valve stems for compressors.
- Eccentrics overhauled.
- Compressor cylinder rebored.
- Oiling system overhauled.
- New dash-pot parts.

Many of the above-named parts will last for some time with good care.

STEAM-DRIVEN VENTILATING FAN.

Sturtevant Co., Hyde Park, Mass., 5-inch by 5-inch cylinder, 48-inch exhaust fan. Frame of engine cracked and patched. Repairs required as follows:
New brasses needed and lost motion taken up on crank at crosshead.

SWITCHBOARD.

Three air gauges.
One steam gauge. All in good condition.

TEST SHEET A.

ENGINES.

Inspection cylinder, piston rods, pistons, piston rings, etc.

Engine No. 1, Rand Drill Co., duplex steam compressor:

Piston rod wear when piston is full at crank end, one-eighth inch.

Piston rod wear when piston is full at head end, seven sixty-fourths inch.

High-pressure steam cylinder:

Could not remove head.

High-pressure compressor cylinder:

Engine on crank end.

By caliper fourteen-thousandths of an inch difference between horizontal and vertical wear.

Worn greatest vertically.

Low-pressure steam cylinder:

Vertical wear, head end, five-thousandths of an inch greater on head end than on crank end.

Piston rod worn one sixty-fourth of an inch on crank end; five sixty-fourths of an inch on head end.

Low-pressure compressor cylinder:

Vertical wear seven one-thousandths of an inch greater on head end than crank end.

Horizontal wear three one-thousandths of an inch less on crank end than on head end.

ENGINE NO. 2.

High-pressure steam cylinder:

Worn twenty-one one-thousandths of an inch at half stroke.

Worn four-thousandths of an inch greater vertically on head end than crank end.

Piston rod:

Worn seven-thousandths of an inch greater at crank end vertically than horizontally.

Head end, vertical and horizontal, no wear.

Worn three-thousandths of an inch greater horizontally than vertically at half stroke.

Full size crank end, $2\frac{7}{17}$ inches; head end, $2\frac{1}{2}$ inches, H. P.

Caliper at crank end, $2\frac{3}{8}$ inches.

Caliper at head end, $2\frac{15}{32}$ inches.

Caliper three-fourths stroke vertical O. K.

Caliper horizontally indicates two-thousandths of an inch wear.

Low-pressure steam cylinder:

Position, head end: Cylinder worn seven-thousandths of an inch vertically greater than horizontally.

Low-pressure compressor cylinder:

Position, half stroke: Cylinder worn six-thousandths of an inch greater vertically than horizontally.

Position, head end: Cylinder worn seven-thousandths of an inch greater horizontally than vertically.

Position, crank end: Cylinder worn seven-thousandths of an inch greater vertically than horizontally.

ENGINE NO. 3.

Rand drill compressor, Hews & Philips engine:

Steam cylinder, 10 inches; C. E. rod, $2\frac{7}{16}$ inches; H. E., $2\frac{1}{2}$ H. P.

Steam cylinder, 18 inches; C. E. rod, $2\frac{7}{8}$ inches; H. E., $2\frac{1}{2}$ L. P.

Air cylinder, 26 inches; C. E. rod, $2\frac{7}{16}$ inches; stroke, 20 inches.

Cylinder inspection:

High pressure, steam end.

Head end cylinder worn vertically twelve one-thousandths of an inch greater than horizontally.

Crank end cylinder worn vertically fourteen one-thousandths of an inch greater than horizontally.

Half stroke worn vertically twelve one-thousandths of an inch greater than horizontally.

Cylinder rod worn one thirty-second of an inch.

High-pressure compressor:

Cylinder worn vertically twenty-one one-thousandths of an inch greater than horizontally at head end.

At half stroke worn vertically twelve one-thousandths of an inch greater than horizontally.

Crank end worn vertically twenty one-thousandths of an inch greater than horizontally.

Cylinder badly scored.

Piston:

Piston has been cracked and welded.

Rods:

Worn one sixty-fourth of an inch.

Rings:

Working O. K.

Low pressure, steam end:

Head end worn seven one-thousandths of an inch greater vertically than horizontally.

At half stroke worn seven one-thousandths of an inch greater vertically than horizontally.

Crank end worn seven one-thousandths of an inch greater vertically than horizontally.

Rods:

Worn one sixty-fourth of an inch.

Low-pressure compressor:

Head end cylinder worn four one-thousandths of an inch greater vertically than horizontally.

Half-stroke cylinder worn twenty-one one-thousandths of an inch greater vertically than horizontally.

Crank end cylinder worn six one-thousandths of an inch greater vertically than horizontally.

Rods:

Worn one sixty-fourth of an inch.

ENGINE NO. 4.

Laidlaw Dunn Gordon duplex steam compressor, wear of cylinder of compressor.

High-pressure side:

Worn horizontally twelve one-thousandths of an inch, head end.

Worn vertically nine one-thousandths of an inch greater than horizontally at crank end.

Head-end expansion ring is not working.

Low-pressure side, compressor:

Worn vertically thirteen one-thousandths of an inch greater on crank end than on head end.

Worn horizontally six one-thousandths of an inch at head end.

Only two cylinders on this engine examined, owing to difficulty of removing heads.

Armour Station power plant, unit No. 2.

Laidlaw Dunn Gordon twin compressor; cylinders, 18 by 24 inches and 18 by 24 inches.

Order No. 18368.

Tube company No. 73. Placed in service year 1904.

Station No. 2.

Cylinders:

East cylinder worn eight one-thousandths of an inch greater vertically than horizontally at crank end.

East cylinder worn seventeen one-thousandths of an inch greater vertically than horizontally at head-end stroke.

East cylinder worn ten one-thousandths of an inch greater vertically than horizontally at half stroke.

West cylinder crank end worn fourteen one-thousandths of an inch greater vertically than horizontally.

West cylinder head end worn fourteen one-thousandths of an inch greater vertically than horizontally.

West cylinder half stroke worn seven one-thousandths of an inch greater vertically than horizontally.

Pistons:

East and west pistons on No. 2 compressor worn vertically twenty-eight one-thousandths of an inch.

Valves and valve motion:

Compressor No. 2: All four valve seats are worn, and rocker arms and valves have considerable lost motion.

Crosshead shoes:

Crosshead shoes worn and should be rebabbitted.

New crosshead pin required.

Brasses should be renewed.

Crank pin:

New pin needed.

Piston rods.

Worn one sixty-fourth inch.

Frame:

Requires painting.

Fly wheel:

O. K.

Foundation:

Concrete and cement in good condition.

Base:

In good condition.

Main bearings:

Require overhauling.

Motor:

No. 80572, tube No. 276 on No. 2 compressor. General Electric Co., manufacturers. Direct current.

Rated 90 horsepower; revolutions per minute, 470 rated. Form A, class 6.

TESTS.

Armature and field ground test. Tests clear of grounds. Tests, revolutions per minute, 422.

Temperature test:

Tests temperature—

Armature, 38° C.

Room, 22° C.

Field, 40° C.

Room, 22° C.

	Watts.	Horse-power.	Volts.
Horsepower tests, amperes 135, 6½ pounds air.....	31,050	38.81	230
Tests, amperes 163, 8½ pounds air.....	37,490	46.86	230

Rheostat for above motor very poor.

Rheostat:

95 horsepower volts, General Electric Co. manufacture.

Slate cracked and new copper segments needed.

Temperature test:

Temperature series field electromagnet on rheostat 63° C., room 22° C.

Switch:

One 400 ampere 2-pole single-throw fused switch mounted in asbestos lined wooden box on temporary board controls above motor, and is in good condition.

Commutator:

Commutator needs truing up; otherwise in good condition.

Brush holders:

O. K.

Armature clearance.

At pole pieces O. K.

Brushes:

Brushes do not fit holders. New ones needed.

Frame:

O. K.

Foundation:
O. K.
Belt:
Good condition.
Pulleys:
O. K.
Bearings:
Need attention.
Oil rings:
O. K.

Armour Station power plant, unit No. 1.

Laidlaw Dunn Gordon twin compressor cylinders, 18 inches by 24 inches. Order No. 18370.
Placed in service, 1904.

Cylinder wear:
East cylinder slightly worn vertically.
West cylinder crank end worn vertically six one-thousandths of an inch.
Half stroke worn vertically seven one-thousandths of an inch.
Piston worn twenty-eight one-thousandths of an inch.

Rings:
New rings needed on pistons.

Piston rods:
East piston rod worn one sixty-fourth of an inch.
West piston rod worn one sixty-fourth of an inch.

Crank pins:
Disk crank pins worn must be trued up and rebabbitted.

Shoes:
All crosshead shoes need overhauling, new oil grooves cut in, etc.
New crosshead pins needed.

Brasses and eccentrics:
Require overhauling.

Frame:
O. K.

Base:
O. K.

Flywheel:
O. K.

Foundation:
Concrete and cement in good condition.

Main bearings:
Require overhauling. All valve seats worn, and lost motion in valve motion, rocker arms, etc.

Motor:
Name-plate data—
General Electric Co. No. 80751, type C. L., class 6.
Form A, amperes, 300; volts, 220; speed, 470; horsepower, 90.

Direct current.

Tests, horsepower.	Revolutions per minute.	Watts.	Horse-power.	Air.
Amperes, 180; volts, 230; air, 9½ pounds.....	387.3	41,400	51.75	Pounds. 9½
Volts, 232 (second test).....	386.1	37,120	46.4	9

Grounds:
Armature and field O. K., clear.
Temperature test:
Room, 22° C.
Armature, 46° C.
1 hour run, amperes, 175; volts, 232; air, 9½.
Field test:
Room, 22° C.
Time and conditions same as above.
Field, 40° C.

Commutator:

Needs truing up.

Bearings:

Fair.

Armature:

Clearance poles O. K.

Oil rings:

Good.

Frame:

O. K.

Pulley and belt:

Good.

Base:

O. K.

Foundation:

O. K.

Switch:

Fair.

Rheostat:

Poor.

Temperature test:

Rheostat, series electromagnet.

Room, 22° C.

Series magnet, 65° C.

Armour Station, unit No. 3.

Laidlaw-Dunn-Gordon Co. compressor, No. 18369. Size, 24 by 18 inches. Placed in service, year 1904.

Cylinder wear:

East cylinder worn seven one-thousandths of an inch horizontally at crank end.

Worn seven one-thousandths of an inch vertically at head end.

West cylinder worn seven one-thousandths of an inch vertically at half stroke.

At crank end worn vertically five one-thousandths of an inch.

West pistons worn twenty-eight one-thousandths of an inch.

East pistons worn twenty-one one-thousandths of an inch.

Piston rods:

Worn one sixty-fourth of an inch.

Brasses should be renewed, east cylinder, crank pin.

Disk crank pins trued up and rebabbitted.

Cross-head shoes rebabbitted.

All valve seats require reboring and rebushing.

Lost motion taken out of rocker arms and valve motion.

Frame:

O. K.

Flywheel:

O. K.

Main bearings:

Need overhauling.

Foundation:

O. K.

Base:

O. K.

Motor:

Name plate data—

G. E. manufacture. D. C. No. 152440.

Shunt class 90, Form B.

Amperes, 321; volts, 230.

Speed, 470-540; horsepower, 90; in service year 1908.

Tests:

Temperature test, after 11 hours' run.

Amperes, 170; volts, 230.

Air, 9 pounds.

Room temperature, 22° C.

Armature temperature, 38½° C.

Field temperature, 37° C.

Room temperature, 22° C.

Ground test:

O. K. clear.

Clearance test:

O. K.

R. P. M., 422.6.

Horsepower test:

Amperes, 170.

Volts, 230.

Watts, 39,100.

Horsepower, 48.88.

Air, $8\frac{1}{2}$ pounds.

Commutator:

Needs truing up.

Bearings:

O. K.

Oil rings:

O. K.

Brushes:

50 per cent worn.

Frame:

O. K.

Rheostat:

O. K.

Switch:

O. K.

Foundation and base:

O. K.

Switchboards:

2 panel board on No. 3 motor O. K.

Temporary wooden board on No. 1 and No. 2 motors.

Temporary switchboard:

Very poor.

Canal Station power plant.

One 75-horsepower direct-connected motor-driven Laidlaw-Dunn-Gordon compressor, tube company's No. 265, two 20 by 12 inch cylinders.

Compressor motor:

Fort Wayne, 75-horsepower, 230-volt, type M. P. L. I.

Interpole, No. 13253.

Full load, 266 amperes.

Average load, 100 amperes.

One hundred and twenty-five to one hundred and eighty revolutions per minute.

This unit is in first-class condition; except commutator of motor needs truing up.

Blower:

One 50-horsepower direct-connected Connersville blower.

Order No. 3129, tube company's No. 266.

Displacement $5\frac{3}{4}$ cubic feet per revolution per minute.

Condition first class.

Motor for above:

One 50-horsepower 220-volt Fort Wayne motor, No. 12856, M. P. L. I.

Interpole, shunt wound.

Full load, 180 amperes.

Average load, 110 amperes.

Condition: Commutator needs truing up, otherwise in first class condition.

Switchboard:

Tube company's No. 267.

One 3-panel switchboard. Panels 2 feet 4 inches wide, 5 feet 8 inches high, $1\frac{1}{4}$ inches thick; made of slate, three sections to panel, and equipped as follows:

One double pole D. T., 500-ampere, 250-volt knife switch.

Two 300-ampere, D. P. S. T., 250-volt knife switches.

Two 500-ampere circuit breakers, 250-volt.

C. E. Company's type C, Form P, No. 291405—No. DL 53787.

Two handwheel field controllers.

One Bristol recording watt meter No. 23642, chart No. 325, tube company's No. 236.

(Requires recalibration.)

Two gridiron sectional G. E. rheostats lever control.
 One Thomson astatic ammeter, G. E. make, 0 to 400 capacity.
 One Thomson astatic volt-meter swivel hinged to board. G. E. Co.'s make, 0 to 350 volts.
 Two Schaeffer & Budenberg compressor gauges:
 Range 0 to 20 pounds, 9-inch face. Brass case No. 3978712.
 One recording pressure meter, No. 10036, Industrial Instrument Co., Foxborg, Mass.
 Scale 0 to 20 pounds, 24-hour, 1 12-inch brass face.

The above power plant was installed about three years ago and is practically new and in first-class condition.

TESTS—CANAL STATION POWER PLANT.

Temperature tests:

Date, February 18, 1913.
 50-horsepower direct-connected Fort Wayne motor to Connorsville blower No. 266.
 Time of test, 15-minute period.
 Temperature of room, 70° F.
 Temperature of armature, 82° F. after 1-hour run.
 Load, 110 amperes, 220 volts, 30 horsepower.

Field test:

Normal temperature of room, 70° F.
 Temperature of field, 84° F. after 1-hour run at 150 amperes, 220 volts load on motor, or 41.2 horsepower; approximately allowing 800 watts to 1 horsepower.

Temperature test:

Date, February 18, 1913.
 75-horsepower direct-current Fort Wayne motor direct connected to Laidlaw Dunn Gordon compressor; two 20 by 12 inch compressor cylinders.
 Time, 15 minutes.
 Speed, 126 revolutions per minute.
 Temperature of room, 70° F.
 Temperature of armature, 74° F. after 1-hour run, 4½ pounds pressure.
 Heating effect hardly noticeable, both on armature and fields.
 Load, 100 amperes at 4 pounds pressure; 27½ average horsepower.

Line leakage tests:

Date, February 23, 1913.
 Time, 10.33 a. m.
 Test made by W. A. R.
 I. C. line and return to general post office, 2.54 miles.
 Compressor No. 4 used in test.

Direct pressure:

Condition of test, 10 pounds (20.2-inch Hg.) on line.
 Revolutions per minute, compressor to maintain this pressure, 23.
 Gauge reading, 10¾; steam gauge, 150; steam flow meter, 500.
 Time from shut down to zero on Hg. gauge, 19.50½ minutes.

Drop in pressure as follows:

Drop, ½ pound when engine stopped.
 Drop, 1 pound in 1 minute.
 Drop, 2 pounds in 1½ minutes.
 Drop, 3 pounds in 2 minutes.
 Drop, 4 pounds in 3½ minutes.
 Drop, 5 pounds in 4½ minutes.
 Drop, 6 pounds in 6 minutes.
 Drop, 7 pounds in 7 minutes.
 Drop, 8 pounds in 10 minutes.
 Drop, 9 pounds in 12 minutes.
 Drop, 10 pounds in 19.50½ minutes.

Average drop per minute, 1.9 pounds.

Date, February 23, 1913.

Time, 9.30 a. m.

Direct pressure:

Line, general post office to Kinzie Station and return, 3.59 miles.
Condition of test, 10 pounds (20.2-inch Hg.) on line.
Revolutions per minute, compressor to maintain this pressure, 22.
Gauge reading, 10 $\frac{7}{8}$; steam gauge, 150; steam flow meter, 700.
Time from engine shut down to zero on Hg. gauge, 24 minutes.

Drop pressure as follows:

- Drop, 1 pound when engine stopped.
 - Drop, 2 pounds in 2 minutes.
 - Drop, 3 pounds in 3 minutes.
 - Drop, 4 pounds in 4 $\frac{1}{2}$ minutes.
 - Drop, 5 pounds in 6 minutes.
 - Drop, 7 pounds in 10 minutes.
 - Drop, 8 pounds in 13 minutes.
 - Drop, 9 pounds in 17 $\frac{1}{2}$ minutes.
 - Drop, 10 pounds in 24 minutes.
- Average drop in pressure, 2.4 pounds per minute.

Electrolysis tests.

Location.	Pipe neg- ative to rail volts.	Ampere flow.	Pipe plus to rail volts.	Depth to pipe.	Time.
				<i>Feet.</i>	<i>P. m.</i>
Randolph and State.....	4	.....	.....	3	2.30
Do.....	2	.....	.....	3	2.45
Jackson and State.....	3	.....	.....	8	4.00
Congress and State.....	4	.....	.....	8	4.55
Quincy and Dearborn.....	4	.....	.....	8	4.55
Do.....	2	.....	.....	8	5.05
Dearborn and Thirty-ninth.....	4	.....	.....	4	3.15
Do.....	2	.....	.....	4	3.20

Equipment inspection, general post office.

Terminals:

Three sluice-gate open receivers, Nos. 227, 239, and 243.
Three gravity transmitters, Nos. 336, 238, and 242.
One motor-driven time lock, No. 288.
Illinois Central transmitter, No. 242, has been reconstructed with brass rings and legs; legs with brass bushings.
Scoop cracked.
Scoop and table reconstructed.
Receiver and transmitter on this line worn internally vertically one thirty-second inch.

Northwestern line:

Receiver table has been cracked and welded. Table pan reconstructed.
Transmitter in first-class condition.

La Salle line:

Receiver table back has been cracked and welded. Table and pan reconstructed.
Transmitter in first-class condition.

Canal Station terminals:

One transmitter, No. 232.
One revolving-valve open receiver, No. 233.
One motor-driven time lock, No. 286.
Receiver apparatus in good condition.
Receiver table has been cracked and welded.
Transmitter gates slightly worn; good condition.
Motor-driven time lock in good condition.

	Carriers.
In service.....	431
Being repaired.....	544
Total.....	975

Of the 431 carriers in service inspected, 121 were found in good condition, 292 with cracked old pattern hinges, and 18 with loose riveted hinges. Three of the latter require new bottoms, as rust has formed at joints of same.

All of the above will require new buffers, flanges, hinges, and pins in 30 days' time. All locks were found in good condition.

Of the 544 carriers in repair shop at Canal Station, 215 are ready for service and 329 in all stages of repairs.

Union Station terminals:

Two revolving-valve closed receivers, Nos. 231 and 235.

Two gravity transmitters, Nos. 230 and 234.

One motor time lock, No. 285.

Canal receiver:

Receiver and table in good condition.

Transmitter—Upper half of top section cracked. Crack in scoop. Gates slightly worn.

La Salle transmitter—Gates slightly worn; working parts in good condition.

La Salle receiver table was cracked, and has been welded. Working parts in good condition.

La Salle Station terminals:

Two sluice-gate closed receivers, Nos. 229 and 237.

Two gravity transmitters, Nos. 228 and 236.

One motor time lock.

G. P. O. receiver slightly worn in chamber.

G. P. O. receiver gates slightly worn at clevis pin bottom.

Piston:

Piston rings, rods, and cylinders in good condition.

Slide valve, by-pass, table, and back, and pop valve in good condition.

Transmitter—Chambers reconstructed with brass ring seats and gate lugs with bushings. Gates slightly worn.

Vertical wear of chamber, one thirty-second inch.

Union Line, La Salle Station, receiver:

Chamber, gates, and clevis pin slightly worn.

Pistons, piston rods, cylinders, slide valve, and table back in good condition.

Pop valve fair; piping poor.

Transmitter:

Reconstructed with brass rings and lugs; lugs bushed. Gates slightly worn.

Scoop in good condition.

Motor-driven time lock in good condition.

Twentieth Street Station terminals:

One sluice-gate closed, receiver, No. 257.

One gravity transmitter, No. 256.

Gland broken at front gate on receiver. New bumpers needed.

Transmitter in good condition.

Armour Station terminals:

Two revolving-valve open receivers, No. 249 and No. 253. In service year 1908.

Two gravity transmitters, No. 248 and No. 252. Latter in service year 1904. All in good condition.

Stockyards Station terminals:

One sluice-gate receiver, No. 251.

One gravity transmitter, No. 250.

Receiver table, casting cracked. Main body casting, No. 2953, cracked.

Gate worn, needs refacing. Gate seat worn.

Vertical wear in chamber one-thirty-second inch.

Transmitter in good condition.

Illinois Central terminals:

Two sluice-gate closed receivers, No. 245 and No. 255. In good condition.

Two gravity transmitters, No. 244 and No. 254, in good condition.

One motor-driven time lock, No. 287, in good condition.

Kinzie Street Station terminals:

One revolving-valve closed receiver, No. 24, in good operating condition.

One gravity transmitter, No. 240, in good order.

New bumpers needed on table.

Brass bends used on machines and in station, as follows:

Two 5° brass bends.

Two 90° brass bends.

Three 45° brass bends.

The above should be removed and replaced with cast-iron bends.

Vault inspection.

GENERAL POST OFFICE TO ILLINOIS CENTRAL STATION.

[Date, Feb. 26, 1913.]

Location.	Property of—	Depth.	Material.	Size cover.	Drips.	Condition.
		<i>Ft. in.</i>		<i>Ft. in.</i>		
Indiana Avenue, 105 feet north of Thirteenth Street.	Tube company	5	Concrete.....	2 6	(¹)	
Twelfth and Indiana, south...	do.....	6	Brick.....	2 6	2	
Twelfth and Indiana (west cross walk).	do.....	6	do.....	2 6		
Twelfth and Michigan.....	do.....	3	do.....	2 6		
Twelfth and Wabash.....	do.....	7	do.....	2 6	2	
Twelfth and Alley L.....	do.....	6	do.....	2 6		
Harmon Court and Alley L...	do.....	4 6	do.....	2 6	2	
Eldridge Court and Alley L...	do.....	6	do.....	2 6	(²)	
Peck Court and Alley L.....	do.....	5 6	do.....	2 6	2	
Hubbard and Alley L.....	do.....	4	do.....	2 6		
Harrison, 128 feet south of Alley L.	do.....					
Harrison and State.....	do.....	5	Brick.....	2 6	2	
Harrison and Alley L.....	do.....	4	do.....	2 6	(³)	
Congress and State.....	do.....	6	do.....	2 6	2	
Jackson and State.....	do.....	8 3	do.....	2 6	2	
Quincy and Dearborn.....	do.....	8 3	do.....	2 6		
Twelfth, south of Alley L.....	do.....	6 6				

Owing to snowfall and ice above vaults were not opened up for inspection.

STOCK YARDS LINE.

[Date, Feb. 25, 1913.]

		<i>Ft. in.</i>		<i>Ft. in.</i>		
Indiana and Thirty-first.....	Tube Co.....	6 0	Brick.....	2 6	2	Good.
Michigan and Thirty-first.....	do.....	6 0	do.....	2 6	2	Do. ⁴
Alley L and Thirty-first.....	do.....					Do. ⁵
Alley L and Thirty-second.....	do.....	3 6	Brick.....	2 6		Do.
Alley L and Thirty-third.....	do.....	3 0	do.....	2 6	2	Do.
Do.....	do.....	5 0	Concrete.....	2 6		1 inch water. ⁶
Thirty-third and State.....	do.....	7 0	Brick.....	2 6	2	2 inches water.
Thirty-third and Dearborn.....	do.....	4 0	do.....	2 6		Good.
Thirty-fifth and Dearborn.....	do.....	4 6	do.....	2 6	2	2 inches water.
Thirty-sixth and Dearborn.....	do.....	4 ½	do.....	2 6	2	Good.
Thirty-seventh and Dearborn.....	do.....	6 0	do.....			Do. ⁷
Do.....	do.....					Do. ⁸
Thirty-eighth and Dearborn.....	do.....	5 ½	Brick.....	2 6	2	Do.
Thirty-ninth and Dearborn.....	do.....	4 6	do.....	2 6		Do. ⁹
Fortieth and Dearborn.....	do.....		do.....	2 6	2	Do.
Root and Dearborn.....	do.....	4 6	do.....	2 6		(³)
Root, under viaduct.....	do.....	4 0	Concrete.....	2 6	2	3 inches water.
Wentworth and Root.....	do.....	3 8		2 6		Good. ¹⁰
Fifth Avenue and Root.....	do.....	3 6		2 6		Do. ¹⁰
Princeton and Root.....	do.....	3 4		2 6		Do. ¹⁰
Pennsylvania Viaduct and Root.	do.....	4 6	Brick.....	2 6		Do. ¹⁰
Butler and Root.....	do.....	3 8	do.....	2 6		Do. ¹⁰
Wallace and Root.....	do.....	3 8	Concrete.....	2 6		Do. ¹¹
Union and Root.....	do.....	3 7	Brick.....	2 6	2	Do.
Emerald Avenue and Root...	do.....	4 8	do.....	2 6		Do.
Alley east of Halsted and Root.	do.....	3 6	do.....	2 6		Do. ⁷
Wentworth and Root.....	do.....	1 6				(¹²)

¹ Four 90° bends.

² One closure.

³ Two 90° bends.

⁴ Frozen up; could not get cover off.

⁵ One 12-inch street box.

⁶ Two crossover bends.

⁷ Two 22.30° bends.

⁸ Two test pipes; 12-inch street box.

⁹ Two closure pieces.

¹⁰ Two slant flange closures.

¹¹ Four 22.30° bends.

¹² Dutchman; in service 1905.

Vault inspection—Continued.

ILLINOIS CENTRAL LINE TO ARMOUR.

[Date, Feb. 26, 1913.]

Location.	Property of—	Depth.	Material.	Size cover.	Drips.	Condition.
		<i>Ft. in.</i>		<i>Ft. in.</i>		
Fourteenth Street and Indiana Avenue.	Tube company	5 3	Brick.....	2 6	2	
Opposite 1442 Indiana Avenue.	.....do.....	3 8	.....do.....	2 6	2	
35 feet north of Fourteenth Street.	.....do.....	5 7	.....do.....	2 6	.....
Sixteenth Street and Indiana Avenue.	.....do.....	6	.....do.....	2 6	.....
Eighteenth Street and Indiana Avenue.	.....do.....	4 4	.....do.....	2 6	.....
Eighteenth Street south of Indiana Avenue.	.....do.....	4 2	.....do.....	2 6	2	
Twentieth Street north of Indiana Avenue.	.....do.....	8 7	.....do.....	2 6	2	
Twenty-first Street and Indiana Avenue.	.....do.....	6	.....do.....	2 6	2	
Twenty-second Street south on Indiana Avenue.	.....do.....	6 2	.....do.....	2 6	.....
Twenty-third Street south on Indiana Avenue.	.....do.....	8	.....do.....	2 6	2	
Twenty-fourth Street south on Indiana Avenue.	.....do.....	4	.....do.....	2 6	.....
Twenty-fifth Street north on Indiana Avenue.	.....do.....	8	.....do.....	2 6	2	
Twenty-sixth Street south on Indiana Avenue.	.....do.....	7 4	.....do.....	2 6	2	
Twenty-seventh Street south on Indiana Avenue.	.....do.....	3 5	.....do.....	2 6	.....
Twenty-ninth Street south on Indiana Avenue.	.....do.....	5 8	.....do.....	2 6	2	
Thirtieth Street and Indiana Avenue.	.....do.....	3 2	.....do.....	2 6	.....

Owing to heavy snowfall and ice, above vaults were not opened up for inspection.

KINZIE LINE.

Location.	Property of—	Depth.	Material.	Size cover.	Drips.	Condition.
		<i>Feet.</i>		<i>Ft. in.</i>		
Quincy and Dearborn.....	Tube company	10	Brick.....	2 6	.....	Good.
Monroe and Dearborn.....	.....do.....	11	.....do.....	2 6	2	2 inches water.
Wabash and Monroe.....	.....do.....	11	.....do.....	2 6	2	Do.
Monroe and Michigan.....	.....do.....	10	.....do.....	2 6	2	Good.
Washington and Michigan.....	.....do.....	8	Concrete.....	2 6	¹ 2	New.
Randolph & Michigan.....	.....do.....	8	.....do.....	2	(²)	Do.
State and Randolph.....	City.....	4	Brick.....	2 6	.....	Good.
Dearborn near Lake.....	Tube company	10	.....do.....	2 6	1	Do.
Couch Place, Garrick Theater.	City.....	4	.....do.....	2	(³)	Do.
Clark near Lake.....	Tube company	5½	.....do.....	2 6	(⁴)	2 inches water.
La Salle and Lake.....	.....do.....	7	Concrete.....	2 6	(⁵)	New.
Fifth Avenue and Haddock.....	.....do.....	6	.....do.....	2	(⁶)	Do.
Kinzie Station.....	.....do.....	12	1 drip.....	.....	.....	Good.

Total vaults.....	12
Special street 12-inch drip boxes.....	1
Total number drips.....	8

¹ And 2 offset bends.

² Two 90° bends.

³ Two closures and 2 short bends.

⁴ One closure.

⁵ One pair 22° bends.

⁶ One pair 22.30° bends.

Vault inspection—Continued.

NORTHWESTERN LINE.

[Date, Feb. 24, 1913.]

Location.	Property of—	Depth.	Material.	Size cover.	Drips.	Condition.
		<i>Fect.</i>		<i>Fect.</i>		
Washington and Canal.....	Tube company	10	Concrete.....	2	(1)	Good.
Canal and Monroe.....	.....do.....	5	.....do.....	2	.....	Do.

Total vaults northwestern line, 2.

¹ Two 45° offset bends.

LA SALLE LINE.

[Date, Feb. 25, 1913.]

		<i>Fect.</i>		<i>Ft. in.</i>		
Clark and Harrison.....	Tube company	9	Brick.....	2 6	¹ 2	18 inches water.
Harrison and Federal.....	.....do.....	8	Cement lined..	2 6	.....	4 inches water.
Van Buren and Federal.....	.....do.....	.....	.....	.....	(2)	
Rock Island Viaduct.....	.....do.....	.....	.....	.....	(2)	
Jackson Street and Federal....	.....do.....	.....	.....	.....	(3)	

Total number of vaults.....	2
Total special 12-inch drip boxes.....	2
Total drips.....	5

¹ Frozen and clogged.

² Two 12-inch drips frozen and clogged.

³ One 12-inch box with 2 drips.

STATION U LINE.

[Date, Feb. 25, 1913.]

		<i>Ft. in.</i>		<i>Ft. in.</i>		
Van Buren and Canal.....	Tube company	2 6	Brick.....	2 6	2	2 inches water.
South Van Buren and Canal...	.....do.....	.....	.....	(1)	.....
Harrison and Canal.....	.....do.....	.....	5½ feet concrete	(2)	.....	Good.
Under viaduct, near Canal Street.	.....do.....	4	Brick.....	2 6	.....	Do.
Edison R. R. tracks.....	.....do.....	1 12	Cover.....	.....	³ 2	
Harrison and river.....	.....do.....	6	Concrete.....	.....	.....	Do.
Fifth Avenue and Harrison....	.....do.....	.....	.....	.....	(4)	
Opposite 516 Sherman Street..	.....do.....	5 3	Brick.....	.....	(6)	Do.
La Salle and Harrison.....	.....do.....	.....	.....	.....	(6)	

Total drip boxes.....	4
Total test pipes in vaults.....	4
Total test pipes in 12-inch boxes.....	3
Total vaults Station U line.....	5

¹ One 12-inch cover, 2 test pipes.

² Width extra large.

³ Frozen and clogged.

⁴ One 12-inch box and 2 test pipes.

⁵ Four 90° bends.

⁶ One 12-inch drip vault.

TUNNELS.

Fifth Avenue tunnel, under Chicago River, owned by tube company, in good condition, except lighting equipment, which is out of order.

This tunnel is of concrete construction, 5-foot bore, 625 feet long, with two vertical shafts. North side of river shaft is 54 feet deep. South side shaft is 65 feet deep. Two 2 foot 6 inch cast-iron covers are over shafts.

Harrison Street tunnel, under Chicago River, owned by city of Chicago.

Two brick laterals built and owned by tube company. Laterals have three 2 foot 6 inch manhole covers and are in good condition.

Equipment:

One motor in fair condition. Motor is property of telephone company, but is claimed by tube company.

One pump, in poor condition, requires overhauling.

The piping in Harrison Street tunnel is in good condition. Tunnel is in poor condition and filled with water most of the time.

TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 1, NORTHWESTERN LINE.

Receiver, 29.
Date, February 15, 1913.
Time, 12.50 p. m.
High pressure.
Steam gauge, 147.
Revolutions per minute, 54.
Air, pounds, 6.
Spring, 80.
Flow meter, 3,500.
Indicated ——— horsepower.



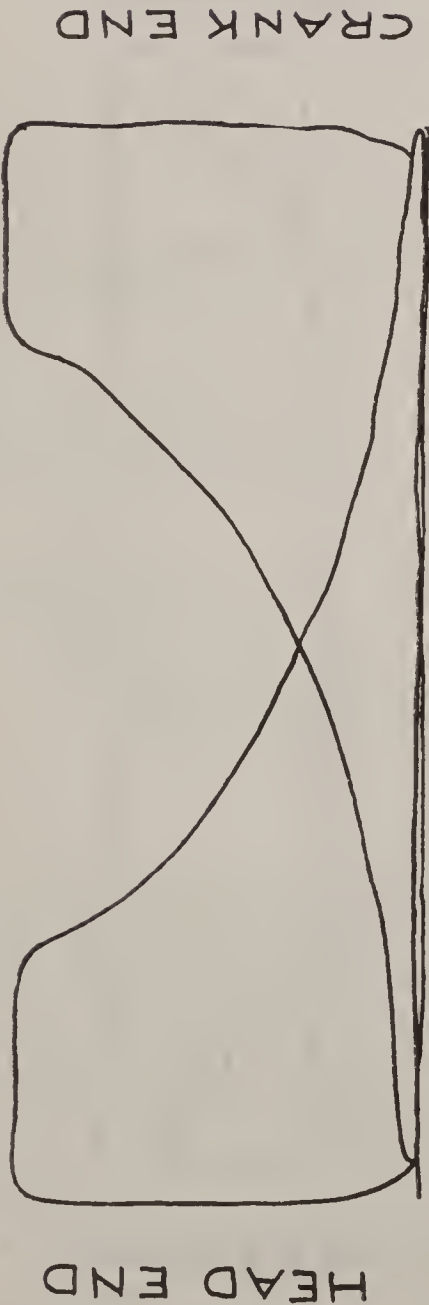
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 1, NORTHWESTERN LINE.

Receiver, 29.
Date, February 15, 1913.
Time, 1.27 p. m.
High pressure.
Steam gauge, 145.
Revolutions per minute, 54.
Air, pounds, 6½.
Spring, 10.
Flow meter, 3,600.
Indicated ——— horsepower.



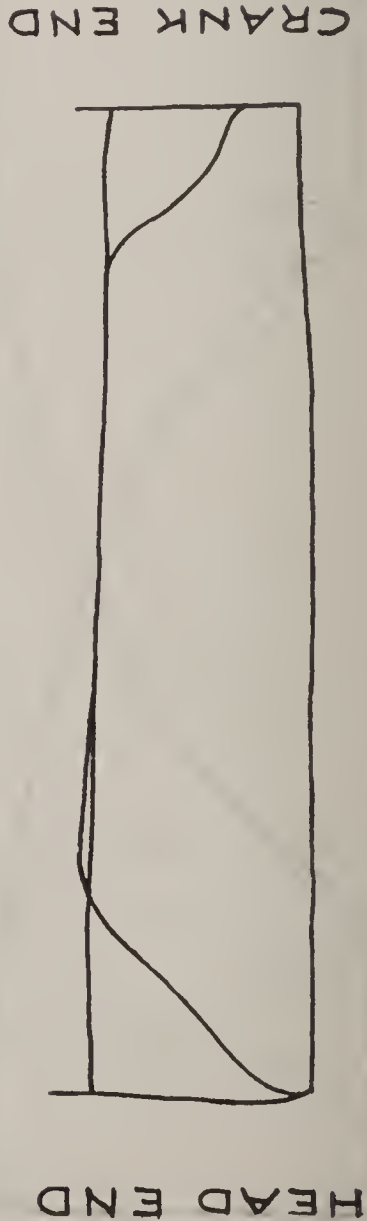
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 1, NORTHWESTERN LINE.

Receiver, 29.
Date, February 15, 1913.
Time, 12.50 p. m.
Low pressure.
Steam gauge, 147.
Revolutions per minute, 54.
Air, pounds, 6.
Spring, 20.
Flow meter, 3,500.
Indicated —— horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 1, NORTHWESTERN LINE.

Receiver, 29.
Date, February 15, 1913.
Time, 1.20 p. m.
Low pressure.
Steam gauge, 145.
Revolutions per minute, 54.
Air, pounds, 6½.
Spring, 10.
Flow meter, 3,600.
Indicated —— horsepower.

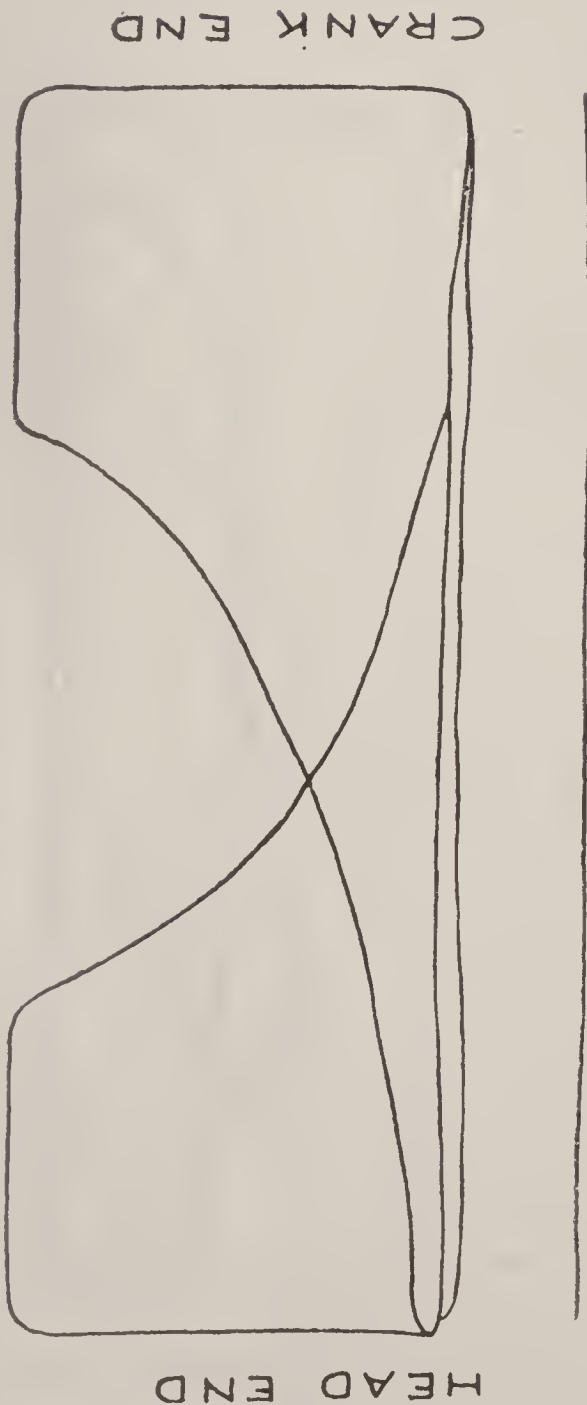


TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 2, LA SALLE LINE.

Receiver, 30.
Date, February 18, 1913.
Time, 9.56 a. m.
High pressure.
Steam gauge, 156.
Revolutions per minute, 65.
Air, pounds, 6.
Spring, 80.
Flow meter, 3,700.
Indicated ——— horsepower.

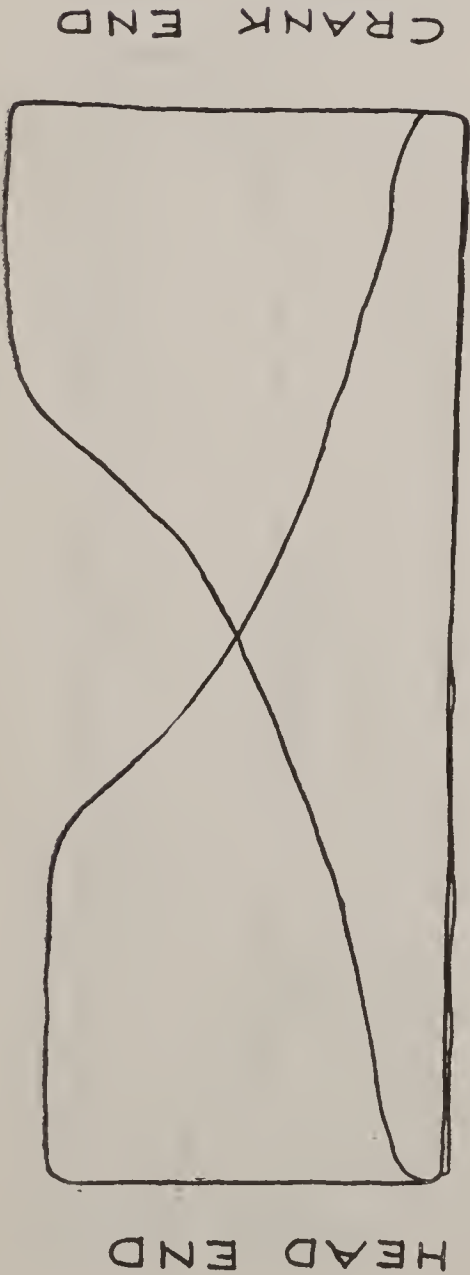
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 2, LA SALLE LINE.

Receiver, 30.
Date, February 18, 1913.
Time, 9.55 a. m.
High pressure.
Steam gauge, 154.
Revolutions per minute, 156.
Air, pounds, 5½.
Spring, 10.
Indicated ——— horsepower.



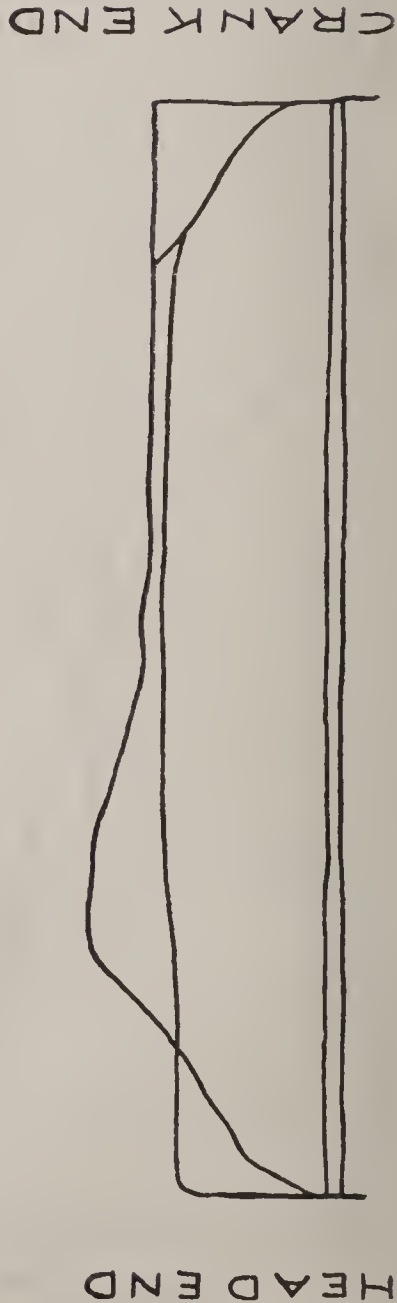
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 2, LA SALLE LINE.

Receiver, 30.
Date, February 18, 1913.
Time, 9.56 a. m.
Low pressure.
Steam gauge, 156.
Revolutions per minute, 66.
Air, pounds, 6.
Spring, 20.
Flow meter, 3,700.
Indicated ——— horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 2, LA SALLE LINE.

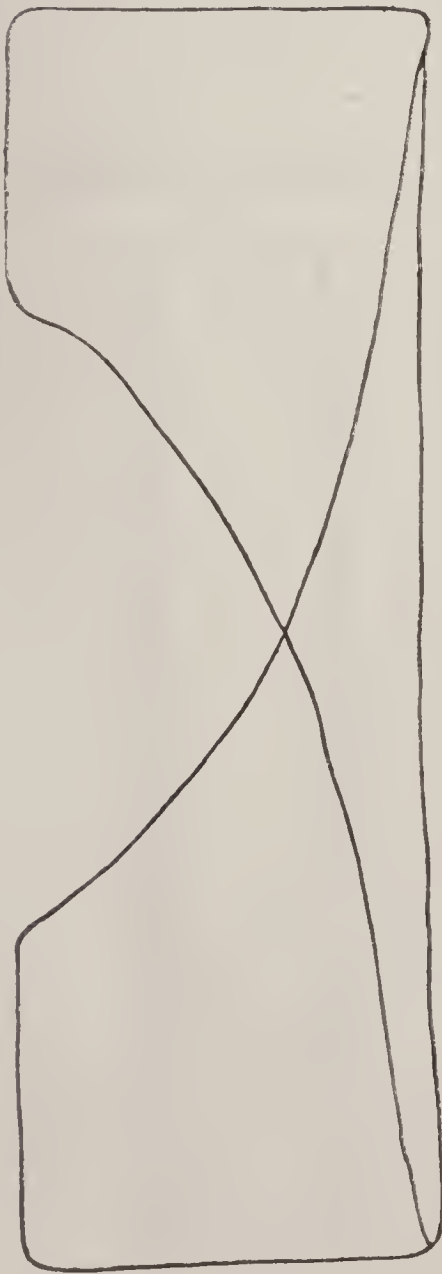
Receiver, 30.
Date, February 18, 1913.
Time, 9.50 a. m.
Low pressure.
Steam gauge, 158.
Revolutions per minute, 65.
Air, pounds, 5½.
Spring, 10.
Indicated ——— horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 3, LA SALLE LINE.

Receiver, 33.
Date, February 15, 1913.
Time, 11.43 a. m.
High pressure.
Steam gauge, 150.
Revolutions per minute, 66.
Air, pounds, 5.75.
Spring, 80.
Flow meter.
Indicated — horsepower.

CRANK END



HEAD END

TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 3, LA SALLE LINE.

Receiver, 33.
Date, February 15, 1913.
Time, 1.35 p. m.
High pressure.
Steam gauge, 154.
Revolutions per minute, 66.
Air, pounds, 6.
Spring, 10.
Flow meter, 3,500.
Indicated — horsepower.

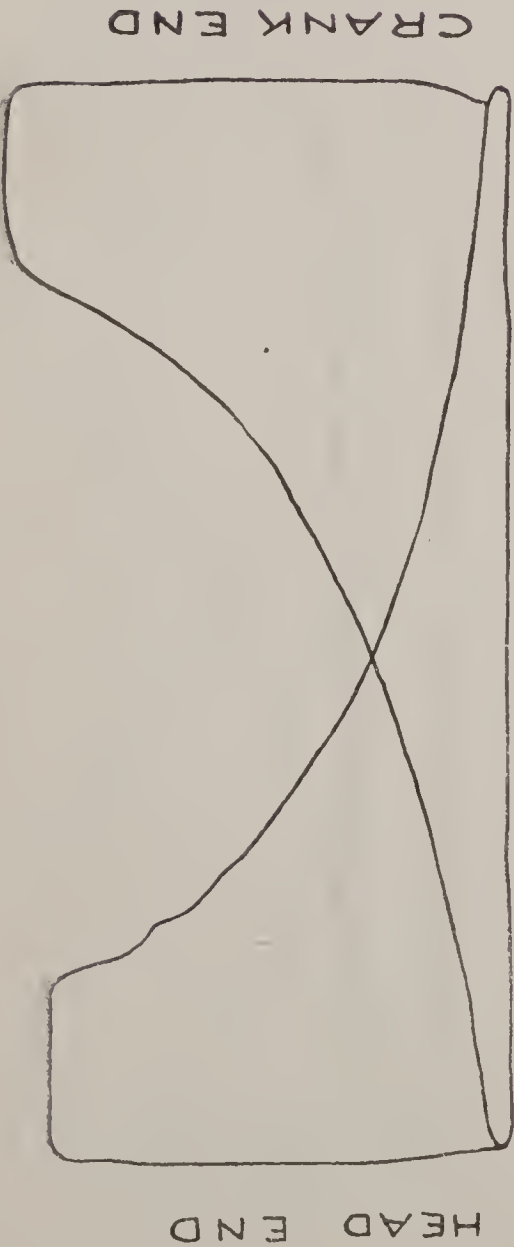
CRANK END



HEAD END

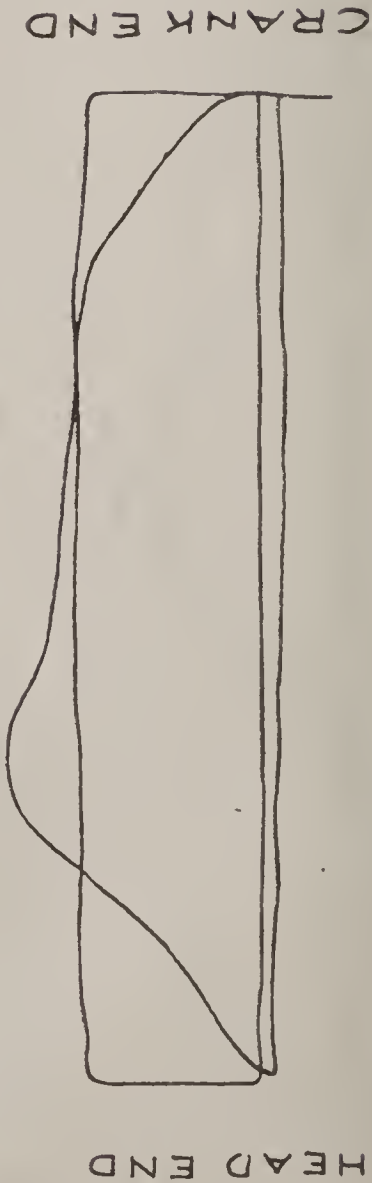
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 3, LA SALLE LINE.

Receiver, 33.
Date, February 15, 1913.
Time, 11.43 a. m.
Low pressure.
Steam gauge, 150.
Revolutions per minute, 66.
Air, pounds, 5.75.
Spring, 20.
Flow meter, 3,700.
Indicated — horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 3, LA SALLE LINE.

Receiver, 33.
Date, February 15, 1913.
Time, 1.50 p. m.
Low pressure.
Steam gauge, 150.
Revolutions per minute, 66.
Air, pounds, 6.
Spring, 10.
Flow meter, 3,500.
Indicated — horsepower.



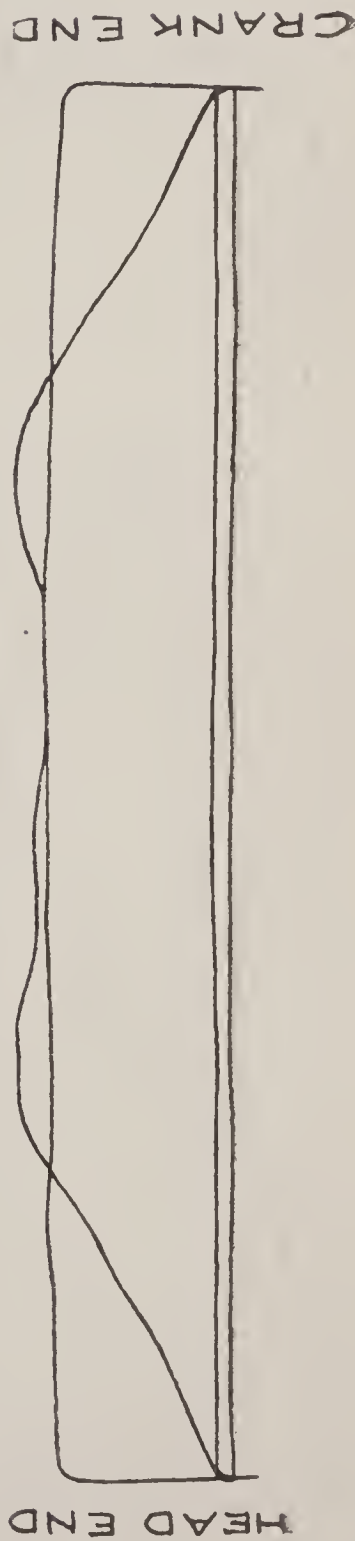
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 4, ILLINOIS CENTRAL LINE.

Receiver, 23.
Date, February 15, 1913.
Time, 12.27 p. m.
High pressure.
Steam gauge, 155.
Revolutions per minute, 43.5.
Air, pounds, 5.75.
Spring, 80.
Flow meter, 3,500.
Indicated — horsepower.



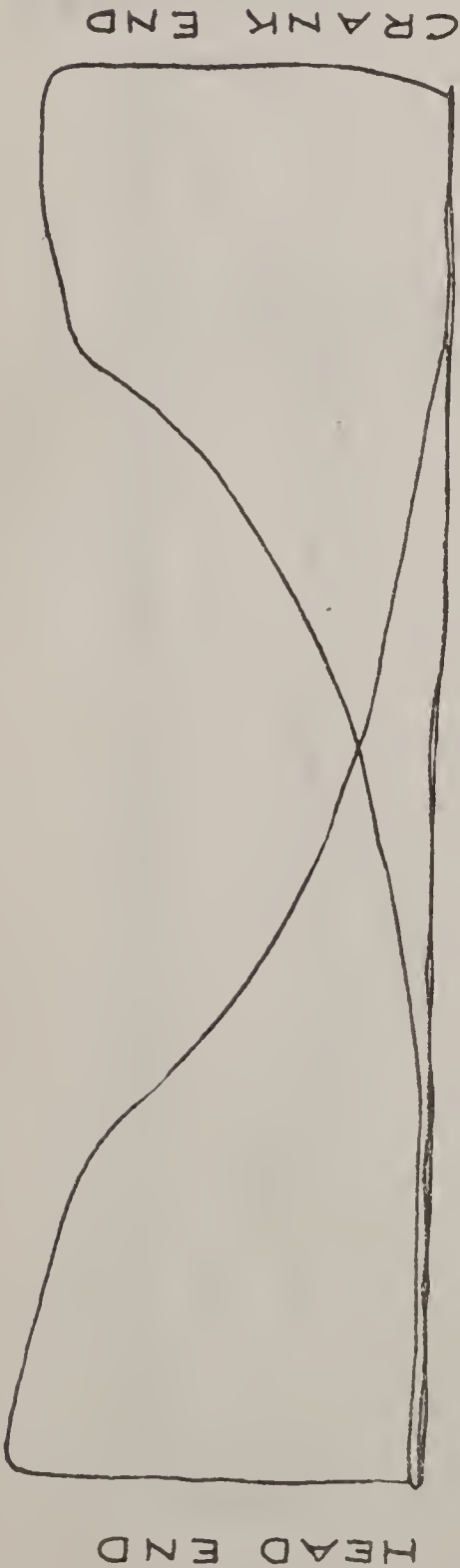
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 4, ILLINOIS CENTRAL LINE.

Receiver, 22.
Date, February 15, 1913.
Time, 1.54 p. m.
High pressure.
Steam gauge, 145.
Revolutions per minute, 43.5.
Air, pounds, 6.
Spring, 10.
Flow meter, 3,600.
Indicated — horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
NO. 4, ILLINOIS CENTRAL LINE.

Receiver, 23.
Date, February 15, 1913.
Time, 12.27 p. m.
Low pressure.
Steam gauge, 155.
Revolutions per minute, 43.5.
Air, pounds, 5.75.
Spring, 20.
Flow meter, 3,500.
Indicated ——— horsepower.



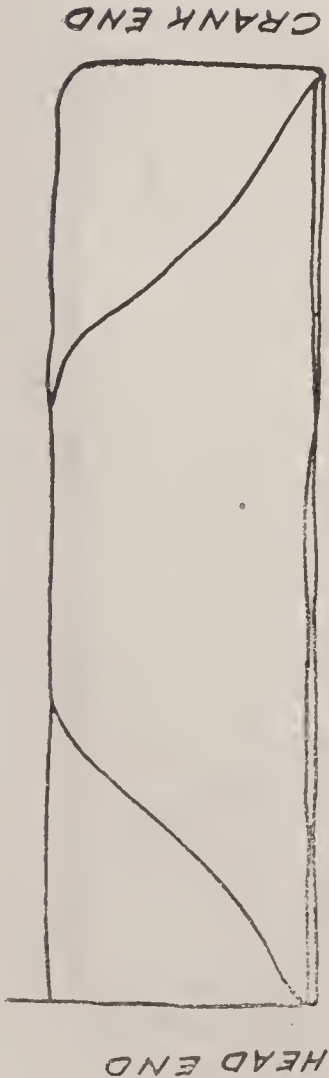
TEST OF CHICAGO PNEUMATIC TUBE CO.'S ENGINE
COMPRESSOR NO. 4, ILLINOIS CENTRAL LINE.

Receiver, 22.
Date, February 15, 1913.
Time, 1.56 p. m.
Low pressure.
Steam gauge, 145.
Revolutions per minute, 43.5.
Air, pounds, 6.
Spring, 10.
Flow meter, 3,600.
Indicated ——— horsepower.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 1, ILLINOIS CENTRAL LINE.

Date, February 20, 1913.
Time, 2.25 p. m.
West cylinder.
Revolutions per minute, 69.
Volts, 230.
Amperes, 140.
Air, pounds, 8.25.
Spring, number, 10.
Electrical horsepower, 40.25.
Tested by W. A. R.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 2, ILLINOIS CENTRAL LINE.

Date, February 21, 1913.
Time, 11.35 a. m.
West cylinder.
Revolutions per minute, 74.
Volts, 230.
Amperes, 160.
Air, pounds, 8.
Spring, number, 10.
Electrical horsepower, 46.
Tested by W. A. R.



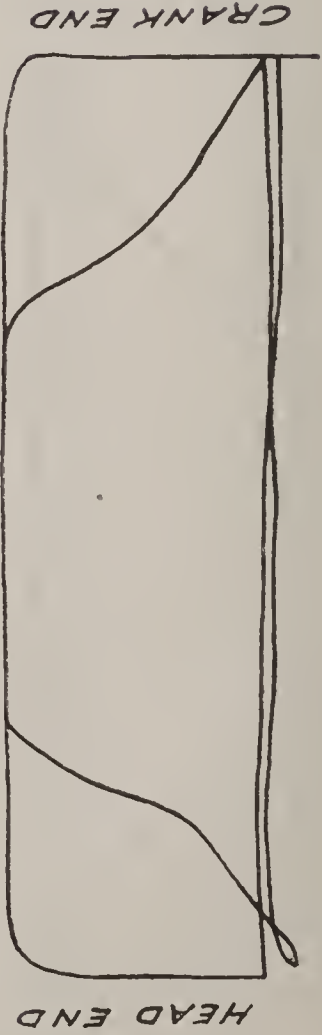
TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 1, ILLINOIS CENTRAL LINE.

Date, February 20, 1913.
Time, 2.50 p. m.
East cylinder.
Revolutions per minute, 69.
Volts, 230.
Amperes, 155.
Air, pounds, 8.625.
Spring, number, 10.
Electrical horsepower, 44.56+.
Tested by W. A. R.



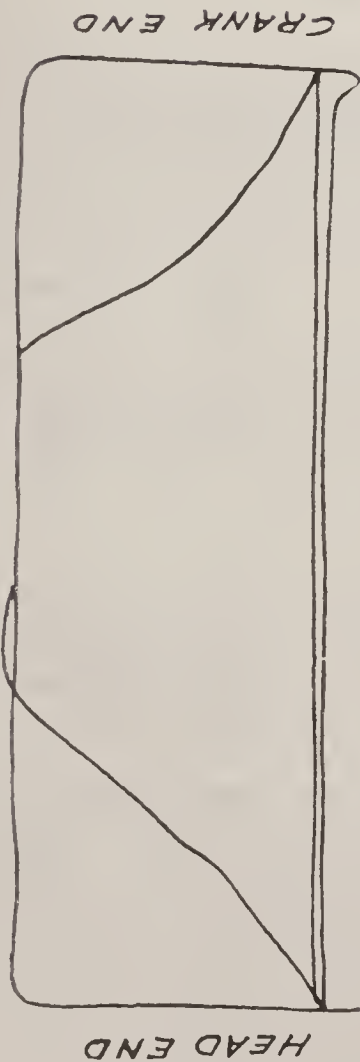
TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 2, ILLINOIS CENTRAL LINE.

Date, February 21, 1913.
Time, 12.25 p. m.
East cylinder.
Revolutions per minute, 74.
Volts, 230.
Amperes, 160.
Air, pounds, 8.
Spring, number, 10.
Electrical horsepower, 46.
Tested by W. A. R.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 3, STOCK YARDS LINE.

Date, February 20, 1913.
Time, 3.25 p. m.
West cylinder.
Revolutions per minute, 67.
Volts, 230.
Amperes, 180.
Air, pounds, 9.5.
Spring, number, 10.
Electrical horsepower, 51.75.
Tested by W. A. R.



TEST OF CHICAGO PNEUMATIC TUBE CO.'S POWER
PLANT AT ARMOUR STATION, CHICAGO POST OFFICE,
COMPRESSOR NO. 3, STOCK YARDS LINE.

Date, February 20, 1913.
Time, 3.50 p. m.
East cylinder.
Revolutions per minute, 67.
Volts, 230.
Amperes, 190.
Air, pounds, 9.625.
Spring, number, 10.
Electrical horsepower, 54.62+.
Tested by W. A. R.



EXHIBIT P.

DATA SHEET CONCERNING CERTAIN PNEUMATIC POSTAL TUBES AND BENDS EXCAVATED AND EXAMINED IN CHICAGO, MARCH 5 AND MARCH 11, 1913.

TUBE AND BEND TAKEN OUT IN SHERMAN STREET, NEAR LA SALLE DEPOT.

12-foot tube. Date installed, 1903-4.

	Original size.	Present size.	Wear.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Bell end.....	8 $\frac{1}{8}$	8 $\frac{11}{64}$	$\frac{3}{64}$
Spigot end.....	8 $\frac{1}{8}$	8 $\frac{12}{64}$	$\frac{2}{32}$

22.30° bend. No. 3944, No. 11. Date of manufacture, 1906; date of installation, 1907.

	Original size.	Present size.	Wear.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Right end.....	8 $\frac{1}{2}$	8 $\frac{33}{64}$	$\frac{1}{64}$
Center.....	8 $\frac{1}{2}$	8 $\frac{42}{64}$	$\frac{10}{64}$
Left end.....	8 $\frac{1}{2}$	8 $\frac{35}{64}$	$\frac{3}{64}$

DATA REGARDING TUBES AND BENDS EXCAVATED MARCH 11, 1913, AT JACKSON BOULEVARD AND FEDERAL STREET.

Illinois Central and La Salle lines.

Depth of tubes, 12 feet.
Condition of soil, sandy.
Condition of tubes, good; several surface rust spots; nothing very deep.
Date of installation of lines: Date on bend, 1906. No. 3944, No. 16.
Measurement:

	Original size.	Present size.	Wear.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Right side.....	8 $\frac{1}{2}$	8 $\frac{36}{64}$	$\frac{4}{64}$
Left side.....	8 $\frac{1}{2}$	8 $\frac{35}{64}$	$\frac{3}{64}$

22.30° bend. No. 3944, No. 40. Date, 1906.

	Original size.	Present size.	Wear.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Right side.....	8 $\frac{1}{2}$	8 $\frac{36}{64}$	$\frac{4}{64}$
Left side.....	8 $\frac{1}{2}$	8 $\frac{36}{64}$	$\frac{4}{64}$

EXHIBIT Q, CHICAGO NO. 4.

CHICAGO, ILL., February 28, 1913.

Commander ALFRED B. FRY, *Consulting Engineer*,
 727 United States Customhouse Building, New York City.

SIR: Pursuant to your letter of instructions of the 7th instant, I have the honor to submit the following report on the physical condition of all power plants, pneumatic-tube lines, and equipment now furnishing pneumatic-tube service to the post-office department in this city, all of which is the property of the Chicago Postal Pneumatic Tube Co., Chicago, Ill.

TUBE LINES—DATE OF INSTALLATION.

There are now in service 19.2034 miles of single 8 $\frac{1}{8}$ -inch cast-iron tubing in the streets of this city which was laid during the past nine years, as follows:

Between the temporary post office (Michigan Avenue and Madison Street) and general post office and Illinois Central tube station, September 14, 1904.

Between the general post office and La Salle Street tube station, September 23, 1904.

Between the Illinois Central tube station, Twenty-second Street (now Twentieth Street station) and Armour Station, October 5, 1904.

Between Armour and Stock Yards station, November 28, 1904.

Between La Salle and station U tube station, December 12, 1904.

Between temporary post office (Michigan Avenue and Madison Street) and Kinzie Street tube station, December 20, 1904.

Between Kinzie Street and Wells Street tube station and temporary post office, October 9, 1905.

Between station U tube station (Union Depot) and Canal Station, July 12, 1911.

Double tubing, 9.58 miles.

POWER PLANTS.

There are three power plants which furnish compressed air for this system, and which are located as follows: Main post-office building; Armour Station, Thirty-first and Indiana Avenue; and Northwest Station Building.

CONDITION.

The power plants at main post-office building and Armour Station require considerable repairs in order to place same in first-class operating condition. (See engine inspection and test sheets attached.) As these plants have been giving service 20 hours per day for eight and a half years they should be given a good general overhauling, or entire new units installed of more efficient design. The power plant at Northwest Station is in first-class operating condition, only a few minor repairs being required.

LINES.

All tests made indicate considerable air leakage on all lines. The amount of same probably could be greatly reduced by placing all receivers and transmitter apparatus in first-class condition. (See "Line leakage tests.")

EQUIPMENT.

Receivers and transmitters.—All transmitters and receivers were carefully examined and found to be in good condition (see sheet "Examination equipment"), few repairs being required to place same in good operating condition.

Carriers.—All carriers in service were individually examined, and practically all of same should be placed in the shop for overhauling. (See "Carrier inspection sheet.")

Tunnels.—The 5-foot bore 625-foot tunnel under river to north side is in first-class condition. (See sheet on "Tunnels.")

Electrolysis on lines.—Eight tests were made along different portions of lines for electrolysis. (See "Electrolysis test sheet.") All tests gave negative readings from 4 to 1 volt difference in potential between tube line and rails. In no case was a positive pipe reading obtained. Owing to lack of time no excavations were made to determine ampere flow. However, it is my opinion that were an electrolysis survey made of all pipe routes and the tubes uncovered in various places along the lines, undoubtedly the pitting and corrosion of pipes due to electrolysis would be located at different points, particularly near the street car power plants. As the leaded joints of the tubing do not carry current as readily as the threaded joints of

water and gas piping, the tube lines would be protected somewhat at the expense of the gas and water mains throughout the city, and inasmuch as a great many of the pipes laid in the downtown section of the city are 6 feet or more below the car rails, I do not anticipate any serious trouble from this source. Also the subject of electrolysis has been taken up by the city council in this city, and if the ordinance recently passed by the council is enforced, no future thought need be given the subject, as adequate protection will then be provided all piping laid in the city streets.

Physical condition of cast iron in service.—A section of pipe which had been in service under the ground at Harrison Street and Fifth Avenue for the past eight years has just been removed and broken in a number of pieces, the iron appearing to be in first-class condition, the surface of one section being pitted and corroded, but not to any great extent. No evidence of crystallization or great internal wear could be found.

Bends.—All brass bends have been removed from lines and replaced with cast-iron bends, except at Kinzie Station, and it is my opinion that were these brass bends uncovered they would undoubtedly be found in poor condition. As to the internal wear on the cast-iron bends in service, it will be necessary to remove a section from a going line in order to obtain any accurate information on this subject.

GENERAL.

With the exception of the General Post Office and Armour Station power plants, the entire pneumatic-tube system, in my opinion, is in a fair operating condition, the physical condition of the lines good, except as to possible leakage at joints. The latter could be exactly determined by making blank flange tests on all lines. All vaults were found in fair condition (see "Vault inspection"), except as to drainage.

DISPATCHING AND RECEIVING APPARATUS.

The dispatching and receiving apparatus is in good condition considering its age, though more efficient and positive types of machines, such as the Batcheller, have been invented since the installation of the types in service. Most of the trouble experienced at the present time has been due to disintegration of carriers, which trouble could be eliminated by careful attention being given to carrier repairs.

INVENTORY.

Inventory and detail of inspection and tests will be found on attached sheets.
Respectfully,

WM. A. RICHARDSON,
Assistant Chief Engineer.

EXHIBIT S, B. P. T. CO. NO. 1.

BOSTON PNEUMATIC TRANSIT CO.

List of equipment, Feb. 5, 1913.

NOTE.—Where exact date of purchase or installation of mechanism or equipment is unknown, approximate date is stated as nearly as possible. Where cost was not ascertainable, column is left blank.

	Year installed.	Cost.	Condition.
SHOP EQUIPMENT.			
1 motor drill press:			
Drill.....	1908	\$45.00	Fair.
Motor.....	1908	50.00	Do.
1 motor grinder.....	1908	40.00	Good.
1 motor blower.....	1908	15.00	Do.
1 manhole pump.....	1910	5.00	Poor.
Soldering apparatus.....	1908	25.00	Good.
Miscellaneous tools, carriers' supplies.....	1903-1912	250.00	Fair.
Machine parts, etc.....	1903-1912	300.00	Good.
STREET EQUIPMENT.			
2 force pumps.....	1908	10.00	Poor.
Set of 500-foot rods, drills, 3 picks, 6 shovels, etc., for street work.....	1903-1912	75.00	Fair.
Manhole covers, spare bends and closures, etc. (spare).....	1910-1912	300.00	New.
Emergency Dutchman (spare).....	1910-1912	120.00	Do.



MAP OF *Exhibit R*
PORTION OF BOSTON MASS.
SHOWING
ROUTES OF PNEUMATIC MAIL TUBES
BOSTON PNEUMATIC TRANSIT CO.
BOSTON, MASS
1911

SCALE: 1 INCH = 2275 FEET.

NOTE:
— INDICATES TWO PNEUMATIC TUBES
○ POWER STATION

BOSTON PNEUMATIC TRANSIT CO.—continued.

List of equipment, Feb. 5, 1913—Continued.

	Year installed.	Cost.	Condition.
EQUIPMENT.			
General post office:			
Terminals—			
1 sluice gate open receiver, No. 154.....	1906	\$700.00	Good.
1 revolving valve open receiver, No. 155.....	1903	800.00	Do.
2 gravity transmitters, Nos. 153 and 156.....	1908	.....	Do.
1 motor time lock, No. 291.....	1912	60.00	Excellent.
Power plant—			
1 75-horsepower Rand drill duplex steam compressor, No. 177...	1903	4,800.00	Do.
2 60-horsepower Rand drill duplex steam compressors, Nos. 178, 179.	1897	7,800.00	Good.
1 air receiver, No. 180.....	1897	200.00	Excellent.
1 panel board (steam and air gauges).....	1912	.....	Good.
North Station:			
Terminals—			
1 sluice gate closed receiver, No. 151.....	1904	.....	Fair.
1 gravity transmitter, No. 152.....	1904	.....	Good.
South Station:			
Terminals—			
2 revolving valve closed receivers, Nos. 157, 159.....	1903	.....	Do.
2 gravity transmitters, Nos. 158, 160.....	1908	.....	Do.
1 motor time lock.....	1912	60.00	Excellent.
Essex Station:			
Terminals—			
2 revolving valve open receivers, Nos. 163, 165 (10-inch).....	1901	.....	Good.
1 revolving valve closed receiver, No. 161.....	1903	.....	Do.
2 revolving valve 10-inch transmitters, Nos. 164, 166.....	1901	.....	Do.
1 cradle transmitter, No. 162 (8).....	1897	.....	Fair.
Power plant—			
2 Rand drill belt-driven duplex air compressors. Nos. 184, 186...	1901	3,412.50	Excellent.
1 Connersville belt-driven blower, No. 188.....	1906	1,000.00	Do.
3 General Electric Co. 50-horsepower motors Nos. 183, 185, 187..	1908	1,836.00	Do.
2 combination remote control panel boards, Nos. 181, 182.....	1908-1910	1,178.00	Do.
1 Standard panel board.....	1908	189.00	Do.
1 air receiver No. 199.....	1901	200.00	Do.
Recording instruments, gauges, belting.....	1901	270.00	Fair.
Back Bay Station:			
Terminals—			
1 revolving valve closed receiver No. 167.....	1903	.....	Good.
1 revolving valve transmitter No. 168.....	1903	.....	Do.
Station A:			
Terminals—			
1 revolving valve closed receiver No. 169.....	1903	.....	Fair.
1 revolving valve transmitter No. 170.....	1901	.....	Do.
Roxbury Station:			
Terminals—			
1 revolving valve open receiver No. 171.....	1901	.....	Good.
1 revolving valve closed receiver No. 173.....	1906	.....	Do.
2 revolving valve transmitters Nos. 172, 174.....	1901	.....	Do.
Power plant—			
2 Rand Drill Co. belt-driven duplex compressors Nos. 190, 192 (\$1,706.25 each.)	1901	3,412.50	Fair.
2 General Electric Co. 50-horsepower motors Nos. 189, 191 (\$1,040 each).	1903	2,080.00	Do.
1 air receiver No. 198.....	1901	200.00	Excellent.
2 panel boards.....	1903	150.00	Fair.
1 motor-driven time lock.....	1910	400.00	Good.
1 power control apparatus.....	1910	300.00	Poor.
Belts.....	1901	200.00	Fair.
Uphams Corner Station:			
Terminals—			
1 revolving-valve open receiver, No. 176.....	1901	.....	Good.
1 revolving-valve transmitter, No. 175.....	1901	.....	Do.
Power plant—			
1 Rand Drill Co. belt-driven duplex compressor, No. 196.....	1901	1,706.25	Excellent.
1 Connersville belt-driven blower, No. 194.....	1902	1,200.00	Good.
2 General Electric Co. 50-horsepower motors, Nos. 193, 195.....	1901	2,080.00	Do.
1 panel board.....	1901	75.00	Fair.
1 air receiver, No. 197.....	1901	200.00	Do.

NOTE.—Necessary air piping, auxiliary piping, wiring, tools, etc., go with each equipment.

BOSTON PNEUMATIC TRANSIT CO.—continued.

Supplementary list of Feb. 17, 1913.

Tubes, etc.	Year installed.	Cost.	Condition.
Length of 8-inch tubing in use, 4.16 miles, at \$1.65 per foot:			
1.75 miles.....	1897	\$36,241.92	Good.
2.41 miles.....	1903		
Length of 10-inch tubing in use, 9.8634 miles, at \$1.65 per foot.....	1901	85,929.94	Do.
Street vaults, 24, at approximately \$340 each.....	1907-1912	8,160.00	Do.
Sets of bends, approximately 95 pairs; i. e., 190 sets:			
90 (45 pairs) 8-inch, at \$82.....	1908 ¹	7,380.00	Do.
100 (50 pairs) 10-inch, at \$125.....	1902 ¹	12,500.00	Do.
Necessary drips, closures (8-inch).....	1897-1903	1,850.00	Do.
Dutchmen, etc., 74 (estimated), at \$25 (10-inch).....	1901		
Number of carriers, 8-inch line, 300 per set, total 600, at \$15.....	1912	9,000.00	Do.
Number of carriers, 10-inch line, 80 per set, total 160, at \$15.....	1912	2,400.00	Fair.

¹ Average.

EXHIBIT T, B. P. T. CO. NO. 2.

STATEMENT SHOWING IRREGULARITIES IN CONNECTION WITH PNEUMATIC-TUBE SERVICE AT BOSTON, MASS. (ROUTE 504003), REPORTED BY THE POSTMASTER AT BOSTON, MASS., TO THE HONORABLE SECOND ASSISTANT POSTMASTER GENERAL, WASHINGTON, FOR THE CALENDAR YEAR 1912.

February 10, 1912.—Service between Essex Street Station, Station A, and Roxbury Station was out of commission from about 8.15 a. m. Saturday, February 10, until about 7 a. m. February 13. Wagon service was supplied by the contractor for pneumatic-tube service during the interruption. At 9.30 p. m., February 10, 5 “carriers” containing 20 packages of letters postmarked at Roxbury Station and points beyond, February 10, 6.30 to 9 a. m., soaked with water, were taken from the inward tube from Roxbury to Essex Street Station and delivered at Essex Street Station, where the mail was dried out and from where it was afterwards forwarded to its destination. Considerable mail was delayed as a result of this interruption of tube service; about 75 packages of letters failed of regular dispatch from Boston on the night of February 12, as did also a considerable amount of mail on the morning of February 13. Contractor reports: “This interruption was caused by tidewater in some way entering one of the tubes in the vicinity of Dover Street and Harrison Avenue. How this leak occurred or what it is we have not been able to find out, owing to the frozen condition of the ground. It has not, however, caused us trouble since that time. This water on entering the tube was carried by the pneumatic-tube carriers to that point on Harrison Avenue where the tubes cross the tracks of the New York, New Haven & Hartford Railroad. There, because of the very cold weather, this water was frozen, and the pneumatic-tube carriers therefore blocked. This trouble was overcome as quickly as possible, and service resumed. In the meantime, wagon service was provided in accordance with the terms of our contract and on the schedule as provided by your office. The interruption was the first of its kind which has ever occurred in Boston. The primary cause of it, i. e., water entering the tubes, has not been discovered, but as we stated above, is not now bothering us. We regret the delays which occurred, but trust that you will agree that the condition was one entirely beyond our control.”

May 22, 1912.—Service between general post office and North Postal Station was out of commission between 2.15 and 2.35 p. m., and a quantity of mail was delayed in dispatch from Boston as a result. The contractor states that the suspension of tube service was due to some trouble with the receiving machinery at North Postal Station and that the difficulty was corrected as speedily as possible.

June 10, 1912.—Service between general post office and North Postal Station was out of commission between 8.50 a. m. and 10.30 p. m., and considerable mail failed of regular dispatch as a result and was more or less delayed. At 10.30 a. m. that date 20 packages of letters that evidently had been dispatched from South Station tube room to the North Postal Station early in the morning—as they bore facing slips postmarked at points south and west of Boston and in the near vicinity thereto—were delivered at general post office by the tube company’s representative with report that they had been taken from the tube line. About 10 p. m. 13 packages of letters that evidently

had been dispatched from South Station tube room to the North Postal Station early in the day—being covered by facing slips postmarked at near-by points early in the morning—were delivered at general post office by the tube company with report that they were in a carrier that had been taken from the tube on Beacon Hill. During the interruption of tube service mails were carried between general post office and North Postal Station in the wagons of Whipple & Co., contractors for screen-wagon service, route 404001; service being performed by them on the regular trips between the two points and on a number of extra trips between said points; the service being in agreement between the Boston Pneumatic Transit Co. and Whipple & Co. The Boston Pneumatic Transit Co. advises that the trouble was caused by carelessness on the part of one of its employees, who was immediately discharged. The interruption of service was caused by a carrier filled with mail having apparently been dispatched by the tube operator at general post office unlocked, causing it to open in transit, thus permitting the mail to escape into the tube. A considerable quantity of mail was badly damaged, and same was forwarded to destination or returned to sender with explanation, where either action was possible, but some was damaged so badly as to necessitate treating it as "dead."

September 10, 1912.—Service from Essex Street Station via Station A to Roxbury Station was out of order between about 12.25 and 12.55 p. m., and more or less mail was delayed as a result. Contractor reports, "This delay of 20 minutes was caused by an accident to our compressing machinery. Temporary repairs were made as quickly as possible and service continued until final repairs could be made after the shutting-down time at night."

November 20, 1912.—Service from the general post office to the South Terminal (one direction) was out of commission from about 3.55 to 4.13 a. m., and 350 packages of letters were delayed in dispatch varying from 2 hours and 15 minutes to 6 hours, according to destination, as a result. Contractor reports as follows: "Our records show that we had trouble with our transmitting machinery at the general post office from 4 to 4.12 a. m. on November 20, and that during this period some 20 carriers of mail were delayed. The trouble was remedied as quickly as possible and service resumed."

STATEMENT SHOWING INTERRUPTIONS IN PNEUMATIC-TUBE SERVICE AT BOSTON, MASS., FOR THE CALENDAR YEAR 1912, NOT RESULTING IN DELAY TO MAILS.

May 13, 1912.—Tubes at Station A reported blocked from 10.55 to 11.15 a. m. Contractors report: "During the interval in question it was necessary to change over in Essex Street postal station from the regular power unit to the reserve unit because of the breaking of a belt. The accident was one which could not have been foreseen."

May 25, 1912.—Service between general post office and South Station tube room and latter point and Essex Street station was out of commission from 4.13 to 4.25 p. m. Contractors report: "This delay was caused by some small trouble with our operating machinery at the South Station."

August 21, 1912.—Service from the South Terminal Station to the general post office was out of commission from 11.25 a. m. to 11.58 a. m. Contractors report: "This delay was caused by a portion of the machinery breaking at the South Terminal Station and the interval of interruption was used in replacing this broken part. During this interruption wagon service was performed by Whipple & Co. in accordance with our contract with them."

EXHIBIT U, B. P. T. CO., NO. 3.

BOSTON, MASS., *February 28, 1913.*

Mr. ALFRED BROOKS FRY,

Consulting Engineer, 727 Customhouse, New York, N. Y.

SIR: Referring to your letters dated January 30 and February 7, and pursuant to the request therein contained, I beg to submit the following report on the present physical condition of the pneumatic-tube system now in service in Boston, together with a list of equipment, the date of purchase or installation, and the cost, as far as could be ascertained.

I have examined all exposed portions of tubes in street vaults and manholes, with particular reference to any deterioration by corrosion, oxidation, or electrolysis. I have also examined approximately 300 feet of 10-inch double line tube laid in 1901, which was exposed on Boylston Street, incident to excavation for a subway. The exterior of all tubes examined was found to be in excellent condition. In no case had the surface been affected to any appreciable degree, and generally the coating of

asphaltum or other covering was in good condition. Some of the tubes examined were laid in streets where street car lines are located, but in no case was any electrolysis apparent. On Boylston Street, where the subway was being constructed, sections were removed in connection with the work. Sections of the pipe were cut out and a careful measurement showed that the tubes were not wasted on the exterior and that the wear on the interior was not appreciable.

On February 20 excavation was made on Derne Street, near manhole at corner of Derne and Temple Streets, and on the following day a length of tube 12 feet 2 inches long, connecting with 90° bend was removed from trench and replaced by a new tube. The tube was marked for identification and taken to the company's shops, where it was measured. The tube was laid in 1897. The measurements were as follows: Average vertical diameter of the two ends, 8.146; average horizontal diameter, 8.149; showing a wear of eleven one-thousandths on vertical diameter, and fourteen one-thousandths on horizontal diameter from the original standard. Average thickness of the pipe, nine-sixteenths inch.

The exterior surfaces of the tube removed and those exposed by the excavation were found to be in excellent condition, as were the closure pieces and bends adjoining.

The internal surfaces of all tubes are well lubricated so that there is no deterioration from corrosion, and the fiber packing on carriers reduces the wear to a minimum, as indicated by the measurements.

From what has been examined, in my opinion a conservative estimate of the length of life of the tubes would be 50 years on straight runs and half that time on bends, barring breaking of tubes and bends by settlements on account of excavations for other street service pipes, etc.

The power-generating apparatus at the central post office was installed as follows:

Two Rand Duplex steam compressors, installed in 1897, and put in operation December 20 of that year. These units were used alternately 20 hours daily until June 30, 1901, when they were shut down and remained so until November 1, 1902, when they were again put in service, and have been operated alternately with a third unit, which was installed in 1903.

In 1903 a larger unit of the same make was installed to operate the South Station line, and the three units have been used alternately on the two North and South Station lines up to the present time.

This apparatus has always received the best of care. The steam valve gear of the two units installed in 1897 were overhauled in 1908 and 1909, respectively. In 1911 tests of the apparatus by the Government showed high efficiency and that the apparatus was fully adapted to the various loads.

The examination at this time indicates that the apparatus is in excellent condition. Steam and air valves were removed and showed slight wear on steam valves and no appreciable wear on air valves. Both steam and air cylinders yet show the tool marks of the original bore. The steam valve gear of the older units shows some wear on the small parts.

In my opinion, this apparatus should be serviceable for 10 years with ordinary repairs and the replacing of minor parts.

The steam to operate this plant has always been supplied by the Government at rates which have been fixed from time to time in proportion to the amount used.

The steam piping in the compressor room is owned and cared for by the tube company.

The steam required at present is approximately 85 horsepower 20 hours daily.

The steam and air piping is in excellent condition.

The terminal machinery at the general post office is in good working condition.

The present apparatus has replaced from time to time the original machines, up to 1908, since which time the machines now generally in use were adopted as standard. This apparatus operates under conditions which do not impose any great strain or pressure on any of the working parts, consequently the wear on all except the small auxiliary parts is exceedingly light.

North Station.—The receiving and dispatching apparatus in this station, which has been replaced since the original installation, is in fair working condition and handles the carriers without interruption. It apparently should be serviceable for several years.

South Station.—The apparatus at this station was installed as follows: Closed receivers in 1903, when the line was put in service. The transmitters were replaced in 1908 by improved type. The apparatus is in good working condition.

Essex Street Station.—The equipment at this station includes the power generating apparatus for the 10-inch tube lines to Back Bay Station and Station A, the terminal machinery for these lines and also for South Station line, and the shop for repairs to carriers.

The power is supplied by three 50-horsepower direct-current motors, made by the General Electric Co., installed in 1908, to replace the induction motors originally installed. Motors are numbered 152747, 15266, and 15268. Volts, 220; amperes, 190; revolutions, 560.

All are apparently in excellent condition.

Two motors are controlled by combination, remote control panel boards, which permits of handling motors from the dispatching point for carriers. Motors are automatically shut down when no carriers are in the line. The spare motor is controlled by Standard starting panel.

The air pressure for lines is furnished by one Connorsville belt-driven blower and two belt-driven Rand Drill Co.'s duplex air compressors, one of which is operated as a spare unit. The air compressors were installed in 1901 and several years later were equipped with Corliss valve gear. These units are in excellent condition and show very little wear on valves and cylinders. The Connorsville blower was installed in 1906, to replace a compressor of the above-named type, and is in good condition. The belting, which was purchased in 1901, is in fair condition.

The terminal machinery includes one 8-inch cradle transmitter originally installed in 1897 on North Station line, put in service at this station in 1903, in fair condition; one 8-inch revolving valve close receiver, installed in 1903, in good condition; two 10-inch revolving valve open receivers, and two 10-inch revolving valve transmitters, installed in 1901, all in good working condition.

This station being the headquarters of the operating and maintaining force has received proper attention and is consequently in excellent condition generally.

Station A.—The equipment at this station includes the terminal machinery and the necessary air piping. All in fair condition.

Roxbury Station.—The equipment at this station includes the two Rand Drill Co.'s duplex belt-driven air compressors installed in 1901 and used alternately on the line.

The power is furnished by two General Electric Co.'s 50-horsepower alternating-current motors, Nos. 64217 and 64241, special No. 16231, type I, form L, class 10-50-720. Volts, 550; amperes, 50; cycles, 60. Installed in 1901, and apparently in fair working condition.

The valves and internal parts of compressors are in good condition, but bearing and rod boxes show considerable wear. As each unit is used but half the time, with minor repairs and proper attention this apparatus should be serviceable for a period equal to the time it has already been in service.

The 10-inch terminal machinery at this station is in good working condition. The other apparatus is in fair condition.

Uphams Corner Station.—The equipment at this station includes one belt-driven Rand Drill Co.'s duplex air compressor, installed in 1901, and little used, in excellent condition; one Connorsville belt-driven blower, installed in 1902, in fair condition.

Power is supplied by two 50-horsepower alternating-current motors made by the General Electric Co. Shop Nos. 64215 and 64218, type I, form L, class 10-50-720. Volts, 550; amperes, 50; cycles, 60. Installed in 1901. One motor has been used but little and is in excellent condition; the other is in fair condition. Terminal machinery at this station is in good working order.

The shop equipment at the Essex Street Station is generally in fair condition. As such equipment deteriorates rapidly, some of the small tools have been replaced from time to time. The date of purchase on the schedule is approximate, as is also the cost price in each case, some of said prices being estimated.

The sets of carriers in use have been in service for more than a year, but are in serviceable condition at the present time.

The carriers, in my judgment, should not be considered as equipment, but should be charged to the cost of maintenance.

The force required to operate the system is as follows: One superintendent; 1 night inspector; 1 day inspector; general post office, 2 men in engine room, 4 men handling carriers; Essex Street Station, 4 men dispatching tubes; North Station, 2 men dispatching tubes; South Station, 4 men dispatching tubes; Back Bay Station, 2 men dispatching tubes; Station A, 2 men dispatching tubes; Roxbury Station, 4 men dispatching tubes; Uphams Corner Station, 2 men dispatching tubes.

If the operation of the system were placed on an 8-hour day system, in lieu of 10-hour day, the number of employees would necessarily be increased proportionately.

Respectfully,

EDWIN H. PEARSON, *Chief Engineer.*

EXHIBIT W, ST. LOUIS NO. 1.

List of equipment, Feb. 5, 1913.—St. Louis Pneumatic Tube Co.

NOTE.—Where exact date of purchase or installation of mechanism or equipment is unknown, approximate date is stated as nearly as possible. Where cost was not ascertainable, column is left blank.

	Year installed.	Cost.	Condition.
TUBES, ETC.			
Length of 8-inch tubing in use, 3.9760 miles (reported excess over official mileage, 0.0830 mile).	1903-4	\$66,468.55	Excellent.
Street vaults, 5.....	1904	1,000.00	Do.
Sets of bends, 25 pairs; i. e., 50 sets (estimated average cost, \$87 set)...	1908	4,350.00	Do.
Drips, 20.....	1904	800.00	Do.
Test valves, 6.....	(1)	30.00	Do.
Number of carriers, 528 (average value, \$6.75).....	(2)	3,564.00	Fair.
POWER PLANT.			
1 75-horsepower Laidlaw Dunn Gordon duplex steam compressor No. 351.	1904	4,000.00	Excellent.
1 75-horsepower Rand Drill Co. duplex steam compressor, No. 352....	1904	4,000.00	Do.
1 gauge board.....	1909	40.00	Do.
1 air receiver No. 362.....	1904	250.00	Do.
360 feet 8-inch and 10-inch air pipe, 10 gates, 8-inch.....	1904	889.00	Do.
GENERAL POST OFFICE.			
Terminals:			
1 revolving-valve closed receiver, No. 350.....	1904	1,400.00	Do.
1 gravity transmitter, No. 358.....	1904	650.00	Do.
BRIDGE POST OFFICE.			
Terminals:			
1 revolving-valve closed receiver, No. 359.....	1904	1,400.00	Do.
1 gravity transmitter, No. 360.....	1904	650.00	Do.
SHOP EQUIPMENT.			
1 lathe.....	1904	200.00	Fair.
1 drill press.....	1904	90.00	Do.
1 grinder.....	1904	25.00	Do.
1 motor and line shaft, belt, etc.....	1904	225.00	Excellent.
Soldering apparatus, hose, mandrel, holder.....	1911	50.00	Good.
Miscellaneous tools, 50 items.....	(3)	60.00	Do.
Carrier parts, etc.....	(3)	330.00	Excellent.
Machine parts, etc.....	(3)	476.00	Do.
STREET EQUIPMENT.			
Force pump.....	1904	5.00	Fair.
Rods.....	1909	7.50	Good.
Miscellaneous shovels.....	(3)	5.00	Do.
Picks.....	(3)	4.00	Do.
Drills, etc., for street work, 71 linear feet.....	(3)	71.00	Excellent.
Manhole covers.....	None.		
Bends, extra sections, 92.....	1908	749.00	New.
Closure, etc., 4, drip box.....	1904	100.00	Excellent.
Emergency dutchmen, new.....	1912	225.00	Do.
Miscellaneous street tools.....	(3)	146.00	Good.
EQUIPMENT CENTRAL STATION.			
Terminals:			
2 revolving valve open receivers, Nos. 353 and 354, at \$8.50.....	1904	17.00	Excellent.
2 gravity transmitters, Nos. 355 and 356, at \$6.50.....	1904	13.00	Do.
TUBING.			
700 feet finished 8-inch tubing, stored at Roth Tool Co.; 457 feet short lengths tubing, United States customhouse.	1903-4	1,232.55	

¹ Various since 1904.

² Average age, 4 years.

³ Various.

⁴ Since 1904.

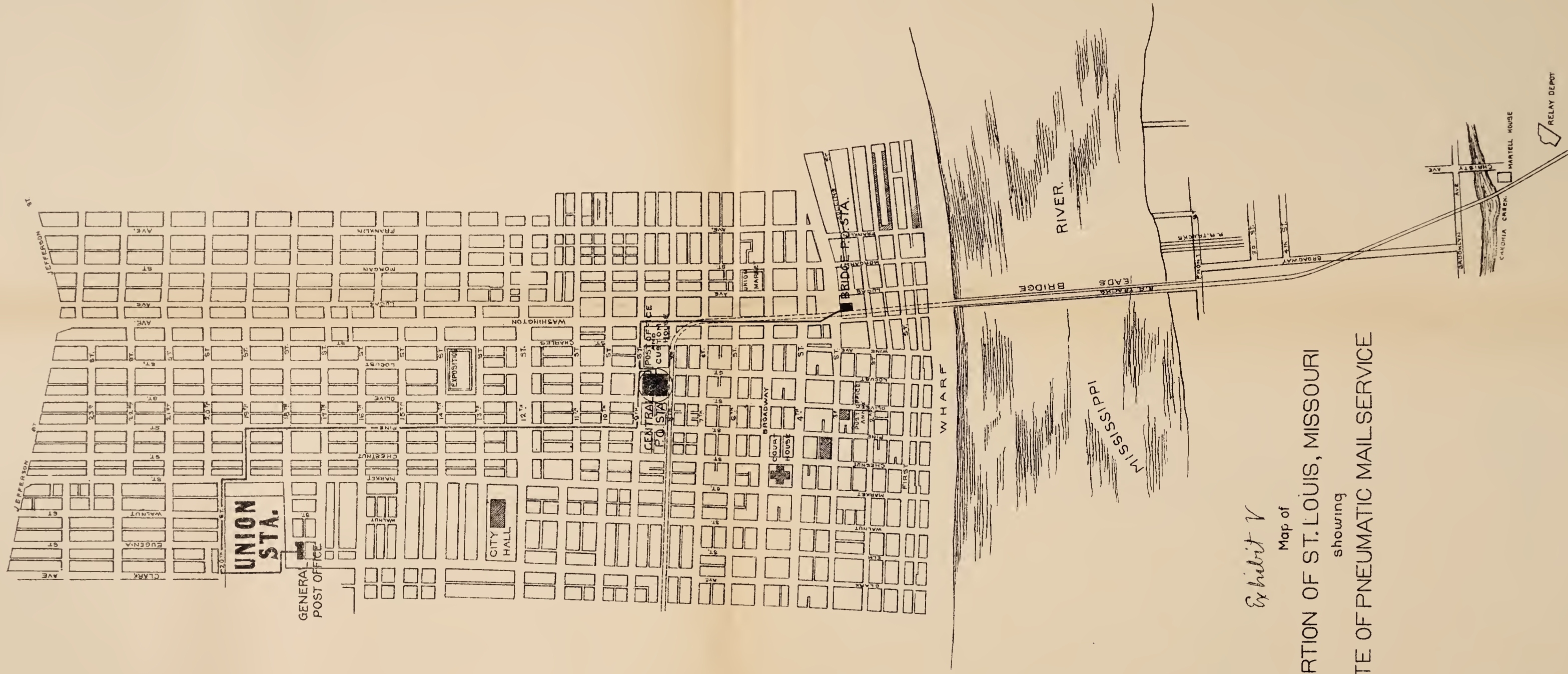


Exhibit V
 Map of
 PORTION OF ST. LOUIS, MISSOURI
 showing
 ROUTE OF PNEUMATIC MAIL SERVICE

NOTE:
 — INDICATES TWO PNEUMATIC TUBES
 ● POWER STATION

List of equipment, Feb. 5, 1913.—St. Louis Pneumatic Tube Co.—Continued.

	Year installed.	Cost.	Condition.
MISCELLANEOUS STOCK AND TOOLS.			
Melting furnace on wheels for 500 pounds lead.....		\$50.00	
500 bolts, $\frac{3}{4}$ by $3\frac{1}{2}$ inches.....		17.50	
400 feet black pipe, $\frac{3}{4}$ inch to 2 inches, and 100 pounds fittings.....		35.00	
1,400 pounds new lead.....		56.00	
200 pounds wrought iron pipe hangers with turnbuckles.....		50.00	
Tool box.....		10.00	
2 test mandrels.....		20.00	
1 extra gravity transmitter, stored at R. Jacob Engineering Works ..	1904	250.00	Under re- pair.
1 extra closed receiver, stored in customhouse.....	1904	1,350.00	Fair.
Office furniture and fixtures, 15 items.....	(¹)	170.00	Do.

¹ Since 1904.

NOTE.—All the items of this survey have been personally examined and the values determined by comparison as far as possible. Where no basis existed for comparison the cost of labor and material were estimated.

NOTE.—Necessary air piping, auxiliary piping, wiring, tools, etc., go with the equipment.

EXHIBIT X, ST. LOUIS, NO. 2

REPORT OF STOPPAGES IN PNEUMATIC TUBE SERVICE BETWEEN MAIN POST OFFICE
AND STATIONS DURING CALENDAR YEAR 1912.

UNITED STATES POST OFFICE,
St. Louis, Mo., February 20, 1913.

Date.	Between—	Duration.	Cause.
January.....			
February.....			
March.....			
Apr. 8.....	Main office and annex station...	7.37 to 8 p. m.....	Unknown.
Apr. 22.....	do.....	11.15 to 12 p. m....	Breaking of hinge on carrier.
Apr. 24.....	do.....	8.05 to 8.40 p. m....	Not known.
Apr. 26.....	do.....	2.55 to 12 p. m.....	Carriers lodged in tubes.
Apr. 27.....	do.....	4 to 8.25 a. m.....	Caused by a washout under the tracks of Terminal Railroad, due to defective guttering on train shed, whereby the drain during unusually heavy rains had been deflected to one place.
Apr. 30.....	do.....	7.25 a.m. to 12 p.m.	Blockade in tube.
May 13.....	Main office and annex.....	8 to 9 p. m.....	Unknown.
June.....			
July 15.....	Main office and annex.....	7.15 to 11.30 p. m..	Do.
Aug. 22.....	Main office, annex, and bridge stations.	7.55 to 9.50 p. m...	Tube machinery out of order.
Aug. 29.....	Main office to annex.....	7.50 to 8.22 a. m...	Not known.
Sept. 30.....	Main office and annex.....	12.10 to 12.39 p. m.	Do.
October.....			
November.....			
December.....			

EXHIBIT Y, ST. LOUIS, NO. 3.

ST. LOUIS, MO., February 21, 1913.

Commander ALFRED BROOKS FRY, Consulting Engineer,
No. 727 United States Customhouse, New York City, N. Y.

SIR: In compliance with your letter dated February 7, 1913, appointing me as your assistant in determining the physical condition of the property of the St. Louis Pneumatic Tube Co., I have the honor to make the following report:

Power-generating apparatus.—The power-generating apparatus is that owned and operated by the Treasury Department, consisting of three 175-horsepower Babcock & Wilcox water-tube boilers with down-draft furnaces and two 200-horsepower boilers of the same manufacture, and with the same kind of furnaces, together with

the usual auxiliary apparatus. The boilers are all in good condition for service. The plant is not nearly used up to its capacity. The Government owns the steam headers and exhaust pipes, separators, and flow-steam meters up to the point of entrance into the tube company's engine room.

Air compressors.—The air compressors are owned by the tube company and consist of the following machines: One Laidlaw-Dunn-Gordon cross-compound Corliss-valve steam engine, with a tandem air cylinder on each side. The diameters of the steam cylinders are 11 inches and 18 inches and that of the air cylinder is 24 inches. The stroke is 24 inches and makes, approximately, 50 revolutions per minute in regular service. The other compressor unit is a Rand, similar in every respect to the Laidlaw, except that the stroke is 20 inches, and the diameter of the high-pressure steam cylinder is 10 inches, and that of the air cylinder is 26 inches. These compressor units are both in excellent condition, both from the standpoint of wear and steam consumption. Examination of the interior of the air cylinder of the Laidlaw showed practically no wear. The tool marks were about as distinct as those in the new cylinder. The rods are not scored nor shouldered, and the valve motions are all in first-class condition. The steam consumption for both units for this load is, approximately, 1,800 pounds per hour. This is slightly more than 50 horsepower, or one-third the rated capacity of the compressors. The light load and slow motion, with the good maintenance of these units, make the amount to be charged off for depreciation much smaller than normal.

The terminals.—The central station at Eighth and Olive Streets, consists of two revolving valve open receivers, Nos. 353 and 354, and gravity transmitters No. 355 and No. 356. The condition of the receivers was determined by careful inspection of the machines in operation and by opening them and making micrometer measurements of the wear or enlargement of the diameter, taken vertically and horizontally. All the moving parts were free from vibration or noise, and no indications of wear. The diameter of the receivers 18 inches back of the valve was 8.140 and 8.142, while the diameter of new straight pipe is 8.140 inches. The transmitters have a larger throat for obvious reasons, and are subject to somewhat more wear, the vertical diameter being 8.282 inches and the horizontal 8.250, or an apparent wear of thirty-two one-thousandths of an inch in the service to which it has been subject. The receiver used on the Bridge line shows only a difference of three one-thousandths of an inch between horizontal and vertical diameter. The depreciation is a negligible quantity. The terminals at the Bridge post office consist of one revolving valve closed receiver No. 359 and one gravity transmitter No. 360, both of which are essentially new. The variation on diameters is five one-thousandths of an inch in the receiver and ten one-thousandths in the transmitter. The machines are in perfect condition as to operation.

The terminals at the new post office consist of one revolving valve closed receiver No. 350, and one gravity transmitter No. 358. A close inspection revealed no defects in the mechanical parts. The micrometer measurements of the receiver were 8.125 and 8.145, a loss from wear in the bottom of twenty one-thousandths of an inch. The loss in the transmitter amounts to thirty-one one-thousandths.

The machines have been kept painted, and the bright parts polished, and all have the appearance of new apparatus.

General conditions of the tube line.—The original tube was laid with cast-iron bell and spigot water pipe bored out with boring bar, and the ends finished with an aligning nipple and socket, and the sections united with a calked lead joint. The bends were originally all of seamless drawn brass with flanges sweated on and bolted up to flanges on iron specials. About five years ago all the brass bends were renewed, and a new style cast-iron sectional bend was adopted which, for the 90° bends, have 6 sections. The sections are machined first in a lathe for the flanges, then drilled for bolts and then finished in a special grinding machine operating on a curve of the radius used in the streets. There are in use 24 bends of 90°, and 26 bends of 4 sections each of 45°. These bends are far superior to the brass bends originally installed.

An effort was made to determine the probable injury that had occurred from electrolysis, and the information obtained from the St. Louis water department was to the effect that no appreciable damage had been done in the district covered by the tubes. Voltmeter tests were repeatedly made in all this territory, with the result that only a fraction of a volt of current pressure could be found, if any.

The water department also reports that the soils of St. Louis are very free from agents producing chemical action on the cast-iron pipe.

Herewith you will find exhibits as follows: Record plans of the underground tubes and other property; plans of changes in line to the new post office, 2 sheets; plans of compressor plant and other parts of the system, 11 sheets; engraved map of the city district indicating route of the lines.

Very respectfully,

EDWIN S. HALLETT,
Engineer.

EXHIBIT Z.

BOSTON, MASS., *February 25, 1913.*A. B. FRY, *Consulting Engineer,**Congressional Committee, Customhouse Building, New York City.*

DEAR SIR: In the last paragraph of the memorandum of general expense in the development and construction of pneumatic mail tubes, which I handed you yesterday, the item of \$193,342 appears as the estimated value of abandoned tube equipment in the various cities. You asked that this amount be separated with respect to the various cities. The separation is as follows:

Boston.....	\$8,700.64
New York.....	144,879.80
Chicago.....	34,718.00
St. Louis.....	5,043.32
	<hr/>
	193,341.76

In reference to the appraisal which I understand you are making of the pneumatic-tube systems, permit me to call your attention to the large amount of money that has been expended by the tube companies on the buildings in which the post-office stations are located that have tube connections. In some cases it has been necessary for the company to tear out and rebuild partitions and floors and make other alterations before the tubes and machinery could be installed. This has been a large item of expense, which does not appear upon examination of the stations at the present time, unless pointed out by some one who was familiar with the original work of installation. Wherever air-compressing machinery has been installed foundations had to be constructed. In the new buildings that have been erected for the exclusive use of the post office, such as stations I and J, space was provided for the pneumatic-tube equipment, so considerable expense was saved the company; but in all of the older buildings the company has been obliged to spend more or less on the buildings to prepare them for the tube equipment.

Respectfully, yours,

AMERICAN PNEUMATIC SERVICE Co.,
B. C. BATCHELLER, *Chief Engineer.*

EXHIBIT Za.

WOULD THE INSTALLATION OF LARGER PNEUMATIC TUBES OR AUTOMATIC ELECTRIC RAILWAY TUNNELS RESTRICT TO ANY EXTENT THE FURTHER INSTALLATION OF 8-INCH-DIAMETER PNEUMATIC-TUBE SYSTEMS?—THE STANDARD SIZE ADOPTED BY THE UNITED STATES POST OFFICE.

(Prepared by M. L. EMERSON, Nov. 15, 1912.)

CONCLUSIONS.

A careful investigation of this subject results in the following conclusions:

First. The question as to the size tube or tunnel to be used between different points is practically a question of cost. The size of the tube is figured not necessarily to carry the total traffic but to carry that traffic from which a sufficient revenue is derived to pay for the service.

Second. The 8-inch-diameter pneumatic-tube system is well adapted for carrying the first-class mail and other mail within its capacity. Its use is justified by the service which it renders and not by its cheapness as a means of transportation. It seems probable that it will ultimately connect the larger post offices in the principal cities.

Third. Tubes or tunnels sufficiently large to carry all the mail will be built in many instances. The adoption of the parcel post should hasten their use. Their particular field, as far as postal service is concerned, would seem to be to connect general post offices and railway depots, particularly when the two are some distance apart.

Fourth. The use of the two types of systems will not conflict in any way and one will not supersede the other. They occupy distinct fields. The small-size system is justified by the fact that it speeds up the delivery of first-class letter mail, special-delivery letters, and intercity mail, all of which pays a high rate per pound in order to secure service as well as transportation. The large-size system is for handling

bulk mail. It is a means for removing traffic from the street and for more quickly and safely, but at a greater cost, carrying this class of mail.

In even a superficial investigation of this question, two pertinent and convincing facts immediately appear as follows:

First. The 8-inch diameter pneumatic-tube systems, "the standard size adopted by the United States Post Office," received the most careful investigation and study by United States postal experts previous to the acceptance of this size as a standard in 1898. In addition, further investigations were made in 1900, 1905, and 1908 by different commissions of postal experts. These commissions without exceptions indorsed the 8-inch diameter pneumatic-tube system as a standard for postal use.

Second. The proposed use of a pneumatic tube or tunnel sufficiently large to carry all the mail is not a new idea. A pneumatic-tube system composed of two large tunnels $4\frac{1}{2}$ feet wide by 4 feet high was built in London in 1872. This system was $2\frac{3}{4}$ miles long, and connected Euston Station with the general post office. One tunnel was for the up traffic, and the other for the down. The tubes were operated by the vacuum-pressure system; in other words, the carriers were sucked through one tube by the creation of a vacuum and forced through the other tube by an increase of air pressure. The system was able to transport over the whole line an average of a ton of mail a minute, and at a speed approximately 14 miles an hour. The system was used to transport mail in bulk, but it was found to be slow and unsatisfactory, and was soon abandoned.

The United States Post Office Department, on the advice of its own experts, adopted the standard diameter pneumatic-tube system which is now used for the transportation of mail between post offices and railway stations in the larger cities. The tube in this system is 8 inches inside diameter. This size was determined upon only after most careful investigation by a commission of post-office officials. Subsequent to the adoption of this size tube, and after the installation of different systems of this type, commissions of post office experts in 1900, 1905, and 1908 again considered this question. Each commission without exception approved of the standard size diameter pneumatic-tube system previously adopted. The following quotations from reports of two of these commissions are pertinent:

Charles Emory Smith, Postmaster General, commenting on the report of 1900 investigating committee, which was appointed by act of Congress, says: "The committee fully sustains the pneumatic method of mail transportation as a valuable and mechanically successful system, * * * and is unanimous in recommending the retention of the service as it now exists and its limited extension as specifically indicated. It can no more be discarded than a fast mail train." The 1908 investigating committee, which was also appointed by act of Congress, says in its report: "Standard of economical system: The opinion is quoted of the chief mechanical expert on pneumatic tube questions that the standard of mechanical efficiency is best represented by a tube 8 inches in diameter rather than by one of larger diameter." * * * Among their other conclusions the following apply to the question under consideration:

"First. The pneumatic tube service is a very important auxiliary for the rapid transportation of first-class mail in the most important cities, and performs a function not at present obtainable by other means. Second. Its constant availability makes it particularly appropriate for special-delivery service, for all first-class mail of local origin for local delivery, for supplementary closings of first-class mail for dispatch by train, and for advance dispatches of first-class mail from trains for city delivery."

Many considerations enter into the determination of the proper size to be adopted for a pneumatic tube system. The two main questions are the capacity of various size systems, and their cost both to build and to operate. Pneumatic tube service is not a cheap means of transportation, at least when the question of speed of delivery is not concerned, and it is judged as a transportation means alone. For this reason the postal experts immediately realized and agreed that first-class or letter mail alone paid sufficient revenue for such a service. The decision then was to adopt as a standard a pneumatic tube system of a size sufficiently large to carry the first-class mail. A tube 8 inches in diameter, which has a capacity of 200,000 letters per hour in either direction, was considered to be amply large to provide for future expansion as well as the then existing amount of mail. The foresight of this early commission is amply confirmed by the report of the last investigating committee in 1908, which states that the capacity of these tubes is utilized approximately as follows:

The greatest extent to which the capacity of any of the tubes is utilized was 66.6 per cent. Of the tubes in service approximately 15 per cent were used to over 50 per cent of their capacity, approximately 28 per cent were used to over 25 per cent but less than 50 per cent of their capacity, approximately 10 per cent were used to over 10 per cent but less than 25 per cent of their capacity, and approximately 47 per

cent were used less than 10 per cent of their total capacity. It is self-evident that had these tubes been of larger diameter the proportion of their total capacity utilized would have been far less than the percentages given above. It is evident, therefore, that an 8-inch system is amply large for the service intended.

In determining on the use of an 8-inch-diameter system, it was also decided that this system should be utilized for all other classes of mail which could go through it, since by so doing its efficiency would thereby be increased.

An 8-inch-diameter pneumatic tube system is not, of course, large enough to carry all the mail. The main reason for not adopting a system sufficiently large for this purpose was evidently that traffic in most instances, at least, would not bear the tax. This condition is explained by the following facts:

The mail carried by the United States Post Office can, in a general way, be divided into two classes. One class is represented by letter mail, which pays a high rate for transportation—i. e., 32 cents per pound. In fact, this is the minimum rate, for few letters weigh 2 ounces, and consequently the actual rate per pound is approximately \$1, for the Post Office figures 50 letters to the pound. This class of mail is not paying for transportation alone, but is also paying for service. It demands to be sent to its destination in the quickest possible time, and it is the endeavor of the Post Office Department to carry out this condition. The other class of mail can, in a way, be represented as freight. It pays for transportation alone, and not for quickness of dispatch or for service. Its rate of pay is as low as 1 cent per pound. It is self-evident, therefore, that the Post Office can afford to pay a much higher rate for transportation for one class of mail than for the other.

There were other reasons for adopting an 8-inch pneumatic tube system, though these reasons are not so important. One of the profitable branches of the Post Office is the Special-Delivery Service. The point in sending a special-delivery letter is to have it immediately forwarded to its destination. With a large-size pneumatic tube system the cost of transporting a single letter, or even several letters, in a large carrier would be prohibitive. The large system, therefore, would not have the advantage of being constantly available for handling the mail.

Again, to be effective, the machinery of such a system must be directly in the workroom, so that time will not be lost in taking mail from and to the system. The carrier in which the mail is transported must not be too heavy for a man to handle both quickly and without a tackle. It must also be possible to transmit the carriers with a close interval of time between them. In the 8-inch system the machinery is placed directly in the workroom. Its size and weight clearly indicates, however, that machinery for a much larger system would necessarily be placed in the basement. The carriers of the 8-inch pneumatic tube system weigh approximately 30 pounds when loaded, and are dispatched as rapidly as 7 or 8 a minute.

Another reason for not handling all the mail by tube or tunnel, and this is a reason which can not be overlooked, is the fact that machinery of any description is liable to breakdowns. The United States mail can not be delayed for any cause whatsoever, and auxiliary means must, therefore, be provided to cover such a situation. This auxiliary service would probably consist of a set of automobiles held in reserve. If such a service were to be installed, it could well be used to carry the bulky classes of mail. If this were done, one of the reasons for making the tubes sufficiently large to carry this class of mail would then be lost.

At the present time postal pneumatic-tube service is used by the Government in six different cities. The length in miles of double pneumatic tubes and the cities where located is as follows:

Boston.....	6. 7740
Brooklyn.....	1. 3500
Chicago.....	9. 6017
New York.....	25. 7689
Philadelphia.....	10. 0000
St. Louis.....	1. 9465
Total.....	55. 4411

It is estimated, omitting the pneumatic-tube system in Philadelphia, which this company does not operate, that the pneumatic-tube systems in other cities are transporting approximately 18,154,000 letters a day, or 5,682,202,000 letters a year. At this rate the cost per letter carried is 0.0136 cent each, or, expressed in another way, 1,000 letters are carried for 13.6 cents. Allowing 50 letters per pound, therefore, this mail is being carried at the rate of 68 cents a hundred pounds.

It is evident, of course, that many letters carried in pneumatic tubes for one reason or another derive no benefit from this fast service. A commission appointed by the

Government in 1908 to investigate pneumatic-tube systems looked into this question. They reported that the cost per letter for mail which actually reached its destination earlier because carried by pneumatic-tube service was 0.06 cent. This is at the rate of 60 cents a thousand letters. In this calculation 2,600,000 letters which were actually benefited were charged the total cost of the service. There were at the same time 11,564,000 letters which were transported free, since they were apportioned no part of the cost.

The pneumatic tube is a mechanical device, and for this reason is subject to breakdowns and interruptions. In some of these breakdowns, particularly when a carrier has an accident while in transit through the tube, or a leak permits surface water to enter the tube, mail is damaged. During the company's last fiscal year there were 240 interruptions to tube service. There were 78.7 lines of tube in service. The average number of interruptions per line was 3.05. Each line operates approximately 6,780 hours per year, which is at the weekly rate of 20 hours per day, and 10 hours on Sunday. These shutdowns represent, therefore, approximately one shutdown in every 2,200 hours of service. The Government fines the company when mail is damaged for reasons within its control. The fines for the last Government year for this cause totaled \$48. As nearly as can be estimated one piece of mail is damaged or soiled in every million pieces handled. Of those damaged, probably less than 5 per cent are destroyed to the extent that it is impossible to deliver them.

In connection with the use of 8-inch diameter pneumatic tube systems, their special utility for city service is also to be noticed. This applies not only to special delivery letters, but to all intercity mail as well. This class of mail represents a large per cent of the total volume carried. It is also the class of mail from which the most profit is derived, and therefore the service for which the Government is justified in spending the most money. It is estimated that the Government makes approximately 1 cent on each letter of this class.

Considering further the question of the use of pneumatic tubes or automatic electric railway tunnels sufficiently large to carry all the mail between certain points, it is evident that there is a considerable field for installations of this kind. The particular use for such a service is indicated above, i. e., where the general post office is located at some distance from the principal railway depots. There may be instances, also, where post offices other than the general post office would have a sufficient volume of business to warrant such an installation. The principal use of such an installation, however, as must be evident, is that of carrying bulk, whereas with a small pneumatic tube the question is that of speed and of service.

An installation of this kind is in reality a miniature railway. It requires space for terminals, switches, sidings, etc., and these must necessarily be located in the basement of buildings with which it connects. For this reason additional mechanical appliances will be required to carry the mail to and from these basements. Again, in operating such a system sufficient space must be allowed between each car or train in order to permit their proper and safe handling in stations. All these factors will tend to slow down the rate of speed at which mail can be transported from its point of origin to its point of destination.

The great and determining element in the use of such systems, however, must be their cost of installation and operation. Leaving aside all other considerations, it is unquestionably a fact that if a system for handling all the mail could be installed and operated at the same cost as a system for handling first-class mail only, such a system would be adopted, even if the first-class mail were not handled so rapidly as it would be in a smaller system. The cost of constructing any systems of this type, however, must vary, roughly, as the diameter of the system. Assuming an 8-inch system to cost \$80,000 per mile, a system 30 inches in diameter might therefore cost approximately \$300,000 per mile. It seems evident therefore from these figures that the use of such a system must necessarily be limited to connections with the most important post offices, and then only in the very large cities.

To sum up, it seems probable that ultimately a combination composed of the standard 8-inch diameter pneumatic tubes and of tunnels sufficiently large to carry the bulk mail will be installed in a few of the largest cities. The 8-inch tubes will handle the first-class mail, the quick connections to and from mail trains, and most particularly the intercity mail and the special delivery letters or telegrams.

The tunnels will handle the bulk mail and the parcel post. The tunnels will connect but one or two of the principal mailing points, whereas the pneumatic tubes will form a network extending to the surrounding postal districts as far as the traffic can afford it. It seems probable that the size of these tunnels will vary from the 30-inch tubes now proposed to tunnels large enough to contain trains operated by motor-men, etc., as in the Illinois tunnel, so called, of Chicago. There is no reason, also, why the pneumatic tubes should all be a standard 8-inch diameter. They will prob-



INTERSECTION OF SEVENTEENTH STREET AND SIXTH AVENUE, NEW YORK CITY, 1906.



CARRIER DATA. POSTAL PNEUMATIC TUBES. MARCH 17, 1913.

10-INCH TUBE.

Outside diameter, $8\frac{3}{4}$ inches.
 Inside diameter, $8\frac{1}{8}$ inches.
 Length outside, 27 inches.
 Length inside, 24 inches.
 Weight, about 44 pounds.
 Average number of letters that can be stowed, say 1,000.
 Maximum number of letters that can be stowed, say
 1,200 to 1,500.

8-INCH TUBE.

Outside diameter, 7 inches.
 Inside diameter, $6\frac{7}{8}$ inches.
 Length outside, 24 inches.
 Length inside, 21 inches.
 Weight, about 23 pounds.
 Average number of letters that can be stowed, say 350.
 Maximum number of letters that can be stowed, say 500
 to 600.

ably vary to as small as 3 inches in diameter, depending of course upon the volume of business which they are to carry.

With all of this service, however, it seems certain that the 8-inch tube, which size was only adopted after most careful consideration, will continue to be the standard size for connecting United States post offices. The principal reason for keeping to this size, particularly in cases where the traffic may not actually be heavy enough for so large a tube, is that its use will permit interchangeability of carriers in the same way as a standard-gauge railway permits the interchange of railway cars. In short, no facts have as yet been presented which tend in any way to upset the recommendations of the United States post-office experts that the 8-inch diameter pneumatic tube system is best adapted for handling the United States mail.

EXHIBIT Zb.

OFFICE OF CHIEF ENGINEER AND SUPERINTENDENT,
UNITED STATES PUBLIC BUILDINGS,
New York, March 17, 1913.

MALCOLM JOHNSTON, Esq.,

Secretary, Pneumatic Tube Postal Commission, Washington, D. C.

DEAR SIR: I transmit herewith—

(a) A photograph showing the 8-inch and 10-inch types of carrier now in service on the postal pneumatic tube systems.

The 10-inch is in use only in Boston on the lines that were originally designed for express business.

The 8-inch is in general use everywhere; being supplemented to some extent by the use of a 6-inch carrier on a single line, i. e., the Bourse line of Philadelphia.

A slip containing the material data concerning said carriers is pasted on the photograph.

(b) A photograph which shows the manner in which the pneumatic mail tubes had to be interlaced in order to get them up Sixth Avenue at the intersection of Seventeenth Street, and also illustrates the depth to which the excavation for this purpose had to be carried.

Respectfully,

ALFRED BROOKS FRY,
Consulting Engineer.

78419—13—25

REPORT OF MR. NATHAN B. WILLIAMS.

WASHINGTON, D. C., *March 3, 1913.*

The Commission to Investigate the Pneumatic Tube Postal System:

DEAR SIRs: I transmit herewith a report upon the franchise rights of pneumatic tube companies in cities where the same are now installed; their rights of way; their patents; and infra, patent monopoly, Government use of patents, and laws involved. * * *

Very respectfully,

NATHAN B. WILLIAMS, *Attorney.*

Principal features of franchise or license requirements.

TUBES.

Boston: No limitation on the size.

New York: Diameter not to exceed 3 feet. under New York Mail & Newspaper Transportation Co. charter.

Chicago: Eight inches.

St. Louis: No limitation.

Philadelphia: No limitation.

USE.

Boston: Carriage of mail, messages, merchandise, and other articles.

New York: Letters, parcels, packages, mails, messages, and other property.

Chicago: Restricted to United States mails.

St. Louis: Restricted to United States mails.

Philadelphia: Restricted to United States mails.

CONTROL.

Boston: Commissioner of public works.

New York: Commissioner of public works.

Chicago: Commissioner of public works.

St. Louis: Board of public improvements.

Philadelphia: Department of public works.

REMOVAL.

Boston: City council may require removal at any time.

New York: No provision.

Chicago: No provision.

St. Louis: No provision.

Philadelphia: No provision.

REPAIRS TO STREETS.

Boston: Person opening surface of street must make repairs for 12 months.

New York: Streets must be restored and maintained.

Chicago: Deposit covering estimates for repair costs must be maintained.

St. Louis: Deposit covering estimates for repair costs must be maintained.

Philadelphia: Repairs must be maintained for three years.

DURATION OF FRANCHISE.

Boston: Occupancy of streets revocable on order of city council.

New York: Twenty-five years from 1897.

Chicago: Twenty years from October 12, 1903, with right of purchase after October 12, 1913.

St. Louis: Twenty five years, presumably from June 10, 1903.

Philadelphia: No term.

FRANCHISE PAYMENTS.

Boston: None:

New York: Tubular Dispatch Co. paid 2 per cent of gross earnings; New York Mail & Newspaper Transportation Co. \$1 for every 100 yards of tubes.

Chicago: Three per cent of gross revenue for first four years, 5 per cent of the gross revenue for the remaining 16 years.

St. Louis: None.

Philadelphia: None.

MISCELLANEOUS.

New York: New York & Newspaper Transportation Co. has contract with Brooklyn Bridge for period terminating March 1, 1922.

EXISTING PNEUMATIC SERVICE CONTRACTS.

The contracts for Boston, New York, Brooklyn, Chicago, and St. Louis are with the American Pneumatic Service Co., or subsidiaries, while the contract for Philadelphia is with the Pneumatic Transit Co.

The principal features of the contracts are as follows:

1. Provide, maintain, and operate under proper franchise.
2. Make all construction, repairs, furnish power, and relocate without expense.
3. Install tubes, receiving and dispatching machinery.
4. Remove tubes, etc., from post office and stations at expiration of term at contractors' expense if required by Postmaster General.
5. Convey all mail which in judgment of postmaster should be transported through tubes, and perform service 20 hours per day.
6. Contract speed is 30 miles per hour.
7. Carry all mails by other means on occasions of stoppage of tubes, subject to deductions in compensation.
8. Employees to be 16 years of age and read and write the English language.
10. Use tubes for no other purpose.
11. Be accountable in damages and save Government harmless from same.
12. Transmit no mail, letters, packets, or newspapers contrary to the laws of the United States.
13. Pay over all moneys belonging to the United States.

SPECIAL STIPULATIONS.

Postmaster General may annul for repeated failures and for violations of the contract.

Postmaster General may deduct by way of fines for damaging the mail or for other delinquency.

No Member of Congress to be interested in contract.

Contractor warrants no infringement of patents and contracts to save Government harmless from all such claims.

FRANCHISES AND ORDINANCES.

BOSTON.

The Boston Pneumatic Transit Co., with whom the contract is made, and which is a subsidiary of the American Pneumatic Service

Co., operates under two ordinances, that of November 30, 1896, granting permission—

To the Boston Pneumatic Transit Co. to lay and maintain underground conduits for pipes and tubes, with suitable manholes therefor, for the purpose of transmitting United States mail, messages, commercial bundles, packages, merchandise, and other articles by means of pneumatic power from place to place in and under the following-named streets of the city (see ordinance); the work of laying said conduits to be done on or before January 4, 1898. And under a further franchise granted February 18, 1898, adding additional streets and without limitation as to time.

The superintendent of streets is authorized to grant permits.

ORDINANCES.

Chapter 3 of the ordinances of the city of Boston, 1908, creates a street department, in charge of a superintendent, now commissioner of public works, who is given general charge of all streets and public ways.

NEW STREETS.

Except in the case of obvious necessity, the surface of new streets shall not be disturbed for the space of one year by any department or person (sec. 8).

Persons opening streets are required to repave or resurface if required at any time within 12 months from the time such opening was made, and on failure to do so the superintendent shall make the necessary repairs at the expense of the person opening the surface of the street. Permits given shall require the placing of the usual safeguards, both by day and night, in the way of lights, movable fences, etc. (sec. 9).

REMOVAL.

The laying by authorized persons of pipes and conduits under the surface of streets shall be on the conditions prescribed in section 9, and such persons—

Shall remove the conduits and wires whenever directed, and not until directed so to do by the city council, and shall not disturb or interfere with any pipes, wires, or sewers lawfully laid in such streets or connected therewith (sec 15).

BOND.

Those to whom permits are issued must give a bond in from \$1,000 to \$20,000, depending upon the character of the work (sec. 17).

CONCLUSION.

It thus appears that the franchises under which the Boston Pneumatic Transit Co. is operating in the city of Boston are in the nature of revocable licenses, subject to be determined at any time by the city council of Boston.

The ordinances are set forth below, together with a letter from the corporation counsel of Boston.

Section 9 of chapter 9 of the ordinances of the city of Boston, referred to in the letter of Joseph J. Corbett, corporation counsel of Boston, follows:

Said commissioner may issue permits to persons having authority in the premises to open, occupy, obstruct, and use portions of the streets, and should the portion of the street which has been so opened or used require repaving or resurfacing within a period of two years from the time it has been so used, the commissioner shall notify the person applying for the permit under authority of which the portion was so used to make such repairs as in the opinion of said commissioner are necessary, and in case of the failure of the said person to make such repairs within one week from the date of the said notification, then the commissioner shall have the right to make such necessary repairs, and the expense of the same shall be paid by such person; all amounts received by the city collector for work done or materials furnished under notification of the commissioner as above authorized shall be placed to the credit and used as a part of the appropriation for the public works department.

Every permit issued as aforesaid shall specify the time, place, size, and use of such opening, occupation, or obstruction, and the time within which the street must be put in good condition, and shall be on a condition the terms of which shall be those stated in chapter 3, section 21, of the Revised Ordinances of 1898, and in addition that the person applying for the permit shall place and maintain from the beginning of twilight, through the whole of every night, over or near the place so occupied, opened, obstructed, or used, and over or near any dirt, gravel, or other material placed in or near such place, a light or lights sufficient to protect travelers from injury: shall place and maintain a safe and convenient way for the use of foot travelers and for vehicles around or over such place; shall protect such trees as shall be designated by the superintendent of public grounds in such manner as he shall specify; shall provide suitable sanitary accommodations for his employees: shall, if he does not within the time prescribed by said commissioner, put the street into good condition satisfactory so said commissioner, pay whatever sum the said commissioner shall expend for putting it into such condition; and shall deliver up the permit to an officer of the police force of said city on or before the expiration of the time fixed in the permit for completing the work, such permit to be returned by said officer to the public works department.

Said commissioner may, in addition to said specifications, specify in the permit, or after the issuing thereof, in writing, the kind of rail or fence to inclose the place and the kind of way over or around such place and the manner of constructing the same. If such a permit is issued to a public service corporation, said commissioner shall detail an inspector to supervise said opening, occupation, and use. Said inspector shall see that the back filling is properly done and the surface repaved or resurfaced to the satisfaction of the commissioner, and a bill shall be deposited monthly with the city collector against the corporations whose work has been inspected for the wages or salaries of said inspectors. All moneys received by the city collector for such inspection as above authorized shall be placed to the credit and used as a part of the appropriation for the public works department.

NEW YORK-BROOKLYN.

The existing contract for pneumatic mail service in New York and Brooklyn is with the New York Pneumatic Service Co. as principal and the American Pneumatic Service Co. surety.

The New York Pneumatic Service Co. appears to have been incorporated in New York on June 29, 1906, and to have succeeded to the franchise rights of the Tubular Dispatch Co. and of the New York Mail & Newspaper Transportation Co.

TUBULAR DISPATCH CO.

It appears from the act passed May 9, 1874 (ch. 400, Laws of 1874, N. Y.), that this company was authorized to lay tubes for the transportation of—

letters, parcels, packages, mails, messages, merchandise, and property underground and beneath the bed of navigable waters in and between the city of New York and the villages, towns, and cities in the neighborhood thereof, on obtaining the consent of the corporate authorities—

and the commissioner of public works in the city of New York.

REPEAL.

The legislature may at any time alter, amend, or repeal this act. It was later amended June 18, 1895, to provide the right to use compressed air, electricity, or any other mechanical method as a motive power.

FRANCHISE PAYMENTS.

The Tubular Dispatch Co. was required to pay 2 per cent of gross earnings to the city of New York, but information has not been received as to whether such payments have been paid since 1904.

DURATION OF FRANCHISE.

Under section 73 of the charter of Greater New York (N. Y. Laws of 1901, ch. 466) it is provided that—

no franchise or right to use the streets, avenues, waters, rivers, parkways, or highways of the city shall be granted by any board or officer of the city of New York under the authority of this act to any person or corporation for a longer period than 25 years—

and it appears that the permits granted to the Tubular Dispatch Co. were made in February, June, July, August, and November of 1897, that some of these grants of permission were not used, and that the corporation counsel advised the commissioner of public works in 1906 that it would be against public policy to recognize as valid the permits which had not been acted upon by the company.

It further appears that the general permit for the New York Mail & Newspaper Transportation Co. was issued on November 10, 1902.

The right and duty at all times to exercise in the interest of the public full municipal superintendence, regulation, and control, in respect to all matters connected with grants to use the public streets of the city of New York, are especially reserved to the city by section 75 of the charter of Greater New York.

NEW YORK MAIL & NEWSPAPER TRANSPORTATION CO.

This company obtained similar rights to that of the Tubular Dispatch Co. by act of March 21, 1893. (Ch. 184, Laws of 1893, N. Y.)

SIZE OF TUBES.

This company is given the right to lay, construct, maintain, and operate tubes not to exceed 3 feet in diameter.

The company may not open the streets of the city of New York, except with the consent of the mayor or the commissioner of public works, and except for repairs not greater than four city blocks of maximum size.

PAYMENTS.

The company is required to pay annually 3 per cent of its gross earnings, or \$1 for every 100 yards of tubes constructed and operated. Information is that it pays under the latter provision, but whether such payments have been fully made to date has not been ascertained.

CONTRACT WITH BROOKLYN BRIDGE.

The New York Mail & Newspaper Transportation Co. appears to have a contract with the trustees of the New York and Brooklyn Bridge permitting the company to, for a consideration of \$1,001 per annum, lay its tubes over the Brooklyn Bridge for a period terminating March 1, 1922.

NOTE.—In the record of the investigation of the Pneumatic Tube Service, 1901, page 86, Mr. Calef, president of the New York Mail & Newspaper Transportation Co., is quoted as follows:

The charter granted to this company by the legislature of the State and its franchises in the city of New York, Boroughs of Manhattan and Brooklyn, as well as its lease of the right across the New York and Brooklyn Bridge, do not permit us to dispose of the present lease of pneumatic tubes without invalidating our rights for the construction of pneumatic tubes for other purposes over the same routes; hence by sale of this right we would lose the most valuable portion of our franchises and relinquish other rights and privileges. The sale, therefore, of our present system to the Government would not be feasible except by express authority of law, the purchase of our patent rights for the Borough of Brooklyn, and remuneration to the stockholders and bondholders for the value of other assets which are taken by the Government or invalidated by the sale of the present system.

The mentioned acts of New York State are here set forth.

CHICAGO.

The contract for pneumatic mail service in Chicago is with the Chicago Postal Pneumatic Tube Co., an Illinois corporation, a subsidiary of the American Pneumatic Service Co.

SIZE OF TUBES.

The license grant of this company is for a maximum size tube, 8 inches inside diameter.

USE.

The use is restricted to carrying United States mails.

REPAIRING.

A deposit covering the estimates of cost for repairing and keeping in repair the streets for one year which may be opened must be made with the commissioner of public works.

CHANGING TUBES.

The commissioner of public works may require tubes to be changed on notice, and if a subway should be constructed in Chicago through streets in which tubes are operated they should be removed to such subway at the expense of the company.

TERM OF GRANT.

The grant is for 20 years from October 12, 1903, with the right of the city to purchase the plants of the company under a specified method of appraisement after October 12, 1913. At the expiration of the grant the tubes become the absolute property of the city; and at the expiration of the contract with the Government the company is required to sell its system of pneumatic tubes to any person or corporation who may obtain such contract with the Government.

PAYMENTS.

The tube company shall pay to the city of Chicago 3 per cent of the gross revenues for the first 4 years of the life of the ordinance and 5 per cent of the gross revenues for the remaining 16 years of the life of the ordinance.

Information has not been received as to whether or not these payments have been made.

The ordinance of the city of Chicago is set forth below.

ST. LOUIS.

The contract in the city of St. Louis is with the St. Louis Pneumatic Tube Co.

TUBES.

Under the ordinance the company has the right to lay and maintain pneumatic tubes in and under certain streets. No limitation is in the ordinance as to the size of tubes.

USE.

They must be used exclusively for the transmission of the United States mail, and a discontinuance or abandonment of such use for a period of one year shall work a forfeiture of all the rights, privileges, and franchises granted.

The work of the company is always subject to the supervision and control of the board of public improvements, and changes or alterations may be ordered at any time.

TERM.

The franchise runs for 25 years, and the company must pay 5 per cent of its gross earnings to the city of St. Louis. Information has not been received as to whether or not these payments have been made. Apparently the franchise will expire June 10, 1928.

The ordinance of the city of St. Louis is set forth below.

PHILADELPHIA.

The contract for pneumatic service is with the Pneumatic Transit Co.

USE.

Limited to the purpose of transmitting United States mail. Tubes shall be laid and constructed in a manner satisfactory to the department of public works.

STREET REPAIRS.

The company is required to repair and repave and keep in repair for three years.

(The ordinance will be found on p. 114 of this book.)

The general ordinance respecting the use of the streets of Philadelphia and the position of the municipality thereof respecting pneumatic-tube construction is set forth below.

THE ACQUIREMENT OF PATENTS BY THE GOVERNMENT.

While incapable of exact determination, considerable stress has been laid upon the "value of the patents," stated as being necessary to the successful operation of the pneumatic-tube system for the carriage of the mails. This is mentioned in the brief filed on behalf of the Pneumatic Service Co. by Mr. Powers, and frequently referred to in the hearings.

It is in the record of the report of 1908, page 115, where the former president of this company, Mr. W. E. L. Dilloway, is quoted as stating emphatically that no claim of monopoly on the part of the American Pneumatic Service Co. of the large tube pneumatic-mail business on account of controlling essential patents could be maintained.

Other engineers representing other systems have given like testimony, and a statement or list of the patents of this company appear in the record.

An examination of these patents, of which there are several hundred in number, discloses a condition which presents serious difficulties to any endeavor to ascertain just what patents, if any, are necessary to the operation of the pneumatic mail tube system.

Lists and memoranda of patents were supplied by the companies, to which reference is made. (See pp. 34, 115, and 211.)

Prior to 1910 patentees had no standing in court to sue the United States Government in the Court of Claims for the use of a patent by an officer of the Government for and on behalf of the Government unless proof was established that a contract to pay could be implied.

This situation was quite frequently the cause of injustice to patentees, and Congress, to remedy this situation, on June 25, 1910 (36 Stat., ch. 423, p. 851), enacted the following law:

AN ACT To provide additional protection for owners of patents of the United States, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whenever an invention described in and covered by a patent of the United States shall hereafter be used by the United States without license of the owner thereof or lawful right to use the

same, such owner may recover reasonable compensation for such use by suit in the Court of Claims: *Provided, however*, That said Court of Claims shall not entertain a suit or award compensation under the provisions of this act where the claim for compensation is based on the use by the United States of any article heretofore owned, leased, used by, or in the possession of the United States: *Provided further*, That in any such suit the United States may avail itself of any and all defenses, general or special, which might be pleaded by a defendant in an action for infringement, as set forth in title sixty of the Revised Statutes, or otherwise: *And provided further*, That the benefits of this act shall not inure to any patentee, who, when he makes such claim, is in the employment or service of the Government of the United States; or the assignee of any such patentee; nor shall this act apply to any device discovered or invented by such employee during the time of his employment or service.

A construction of this statute has been given by the Supreme Court of the United States in the case of *Crozier v. Krupp* (224 U. S., 290), wherein it is stated:

In substance, therefore, in this case, in view of the public nature of the subjects with which the patents in question are concerned, and the undoubted authority of the United States as to such subjects to exercise the power of eminent domain, the statute, looking at the substance of things, provides for the appropriation of a license to use the inventions, the appropriation thus made being sanctioned by a means of compensation for which the statute provides.

And it is further held that it is not necessary that compensation should be made previous to the taking, inasmuch as the statute provides adequate means for a reasonably just and prompt ascertainment and payment of the compensation.

The court was of opinion, and it seems clear, that this statute makes full and adequate provision for the exercise of the power of eminent domain which was the purpose of the statute to provide in respect to the use of patented inventions on the part of the Government.

The decision mentioned was in relation to certain ordnance used by the War Department, but it would appear that the same rule would of necessity apply to similar use of patented inventions by the agents of the Government in respect to any other strictly governmental purpose.

See also *United States v. Anciens Etablissements* (224 U. S., 309).

It is not known whether or not any of these devices were "discovered or invented" by an employee of the Government "during the time of his employment."

Respectfully submitted.

NATHAN B. WILLIAMS.

BOSTON, February 20, 1913.

NATHAN B. WILLIAMS, Esq.,

Attorney Pneumatic Tube Commission,

United States Senate, Washington, D. C.

DEAR SIR: His honor John F. Fitzgerald, mayor of the city of Boston, has requested me to reply to your recent letter concerning the operation and installation by the United States Government of mail service by pneumatic tubes through the streets of this city.

I am aware of no reason for any change in the attitude toward this subject as expressed on pages 67 and 74 of the report made in 1908. There has been no change in the legislation as contained in that report and there has been merely a formal change in the ordinance as there printed by further consolidation of departments, so that the then superintendent of streets is now the commissioner of public works.

I inclose a copy of the ordinances of the city of Boston passed in the year 1910-11, of which chapter 9 is the ordinance on this subject as now in force.

Yours, truly,

JOSEPH J. CORBETT, *Corporation Counsel.*

FRANCHISE TO BOSTON PNEUMATIC TRANSIT CO.

CITY OF BOSTON, *November 30, 1896.*

In Board of Aldermen:

Ordered, That permission be granted to the Boston Pneumatic Transit Co. to lay and maintain underground conduits for pipes and tubes, with suitable manholes therefor, to be used for the purpose of transmitting United States mail, messages, commercial bundles, packages, merchandise, and other articles by means of pneumatic power, from place to place, in and under the following-named streets of the city, viz: Devonshire Street, from State Street to Franklin Street; Franklin Street, from Devonshire Street to Arch Street; Arch Street, from Franklin Street to Summer Street; Summer Street, from Arch Street to Chauncy Street; Chauncy Street, from Summer Street to Essex Street; Essex Street, from Chauncy Street to Washington Street; Washington Street, from Essex Street to Boylston Street; Boylston Street, from Washington Street to and across Park Square to Providence Street; Providence Street, from Park Square to Berkeley Street; Berkeley Street, from Providence Street to St. James Avenue; St. James Avenue, from Berkeley Street to Huntington Avenue; Huntington Avenue, from St. James Avenue to Massachusetts Avenue; Massachusetts Avenue, from Huntington Avenue to Harvard Bridge; Harvard Bridge to the Cambridge line.

Dartmouth Street, from Huntington Avenue to Tremont Street; Tremont Street, from Dartmouth Street to Dedham Street; Dedham Street, from Tremont Street to Washington Street; Washington Street, from Dedham Street to Warren Street; Warren Street, from Washington Street to Dudley Street.

Spring Lane, from Devonshire Street to Washington Street; Washington Street, from Spring Lane to School Street; School Street, from Washington Street to and across Tremont Street to Beacon Street; Beacon Street, from School Street to Charles Street; Charles Street, from Beacon Street to and across Park Square to Providence Street.

Dartmouth Street, from Huntington Avenue to Boylston Street; Boylston Street, from Dartmouth Street to Massachusetts Avenue.

Mt. Vernon Street, from Beacon Street to Temple Street; Temple Street, from Mt. Vernon Street to and across Cambridge Street to Staniford Street; Staniford Street, to and across Merrimac Street to Causeway Street; Causeway Street, from Merrimac Street to the Union Passenger Station.

State Street, from Washington Street to Atlantic Avenue; Atlantic Avenue, from State Street to and across Summer Street to Cove Street, as proposed; Cove Street, as proposed, from Summer Street to Kneeland Street; Kneeland Street, from Cove Street, as proposed, to and across Washington Street to Eliot Street; Eliot Street, from Washington Street to and across Park Square to Providence Street; Milk Street, from Devonshire Street to Oliver Street; Broad Street, from State Street to Atlantic Avenue; Oliver Street, from Milk Street to Atlantic Avenue; Pearl Street, from Milk Street to Atlantic Avenue; Congress Street, from Milk Street to Congress Street Bridge; Federal Street, from Milk Street to and across Summer Street to Cove Street, as proposed; Avon Street, from Chauncy Street to Washington Street; Bedford Street, from Chauncy Street to Washington Street; Harrison Avenue, from Bedford Street to Kneeland Street.

The work of laying said conduits to be done on or before January 4, 1898, at such times and in such manner and places of opening as the superintendent of streets shall issue permits for, and in conformity to the statutes and ordinances.

Passed. Approved by the mayor, December 1, 1896.

A true copy.

Attest:

J. M. GALVIN, *City Clerk.*

AMENDMENT TO FRANCHISE TO BOSTON PNEUMATIC TRANSIT CO.

CITY OF BOSTON,
February 18, 1898.

In Board of Aldermen:

Ordered, In addition to the rights already granted to the Boston Pneumatic Transit Co. to lay and maintain its pipes, permission is hereby further granted said corporation to lay and maintain its pipes, with the necessary manholes and switches, in the following streets and highways, viz:

Harrison Avenue, from Kneeland Street to Dudley Street; Dudley Street, from Eliot Square to junction of Boston, Hancock, and Stoughton Streets; Hancock Street, from Dudley Street to Freeport Street; Freeport Street, from Hancock Street to Dorchester Avenue; Stoughton Street, from Dudley Street to Pleasant Street; Pleasant Street, from Stoughton Street to Freeport Street; Dorchester Avenue, from Broadway to Adams Street; through Eliot Square; Roxbury Street, from Eliot Square to Columbus Avenue; Tremont Street, from Columbus Avenue to Huntington Avenue; Huntington Avenue, from Massachusetts Avenue to boundary line of the town of Brookline; Berkeley Street, from Beacon Street to and across Tremont Street; Boylston Street, from Charles Street to Dartmouth Street; Dover Street, from Tremont Street to and across Dover Street Bridge to West Fourth Street; West Fourth Street, from Dover Street Bridge to Dorchester Avenue; West Broadway, from Dorchester Avenue to Dorchester Street; Columbus Avenue, from Park Square to Center Street; Washington Street, from Dudley Street to Green Street, Jamaica Plain; Green Street, from Washington Street to Center Street; Woolsey Square, from Green Street to Gordon Street; Center Street, from Green Street to Columbus Avenue; Washington Street, from the boundary line of the town of Brookline to Market Street; Henshaw Street, from Cambridge Street to Market Street; Wirt Street, from Henshaw Street to Washington Street; Market Street, from Henshaw Street to Washington Street; Albany Street, from Swett Street to Broadway; Massachusetts Avenue, from Huntington Avenue to Swett Street; Swett Street, from Massachusetts Avenue to and across Dorchester Avenue; Dorchester Street, from Dorchester Avenue to West Broadway; Zeigler Street, from Washington Street to Dearborn Street; Dearborn Street, from Zeigler Street to Dudley Street; Cambridge Street, from Charles Street to Bowdoin Square; Charles Street, from Beacon Street to Cambridge Street; Beacon Street, from Charles Street to St. Marys Street; Prentiss Street, from Tremont Street to Parker Street; Station Street, from Tremont Street to Parker Street; Parker Street, from Tremont Street to Prentiss Street; Conant Street, from Parker Street to Huntington Avenue; Dedham Street, from Harrison Avenue to Washington Street; Brookline Street, from Harrison Avenue to Washington Street; Warren Street, from Dudley Street to and across Blue Hill Avenue to Washington Street; Washington Street, from Blue Hill Avenue to boundary line of the town of Milton; Commonwealth Avenue, from Beacon Street to boundary line of the city of Newton; Causeway Street, from Nashua Street to and across proposed bridge to City Square, Charlestown; Main Street, from City Square to boundary line of city of Somerville.

And the superintendent of streets is hereby directed to issue permits to said company to open and occupy such portions of said streets as may be necessary to lay its pipes in said streets from time to time as it may require them in compliance with this order.

Passed. Approved by the mayor, February 28, 1898.

A true copy.

Attest:

J. M. GALVIN, *City Clerk*.

CHARTER FROM THE STATE OF NEW YORK TO THE TUBULAR DISPATCH CO.

(Chap. 400, Laws of 1874.)

AN ACT To provide for the transmission of letters, parcels, packages, mails, messages, merchandise, and property between the city of New York and the villages, towns, and cities in the vicinity thereof (passed May 9, 1874).

The people of the State of New York, represented in senate and assembly, do enact as follows:

SECTION 1. L. W. Emerson, H. Tracy Arnold, T. L. Harison, C. H. Scrysmar, I. M. Strong, John R. Lawrence, and their assigns, and such persons as they

may associate with them, are hereby authorized and empowered to lay down, construct, and maintain tubes of iron, wood, or other material underground and beneath the bed of navigable waters in and between the city of New York and the villages, towns, and cities in the neighborhood thereof, at such depths below the bed of such waters as not to interfere with the channels, anchorage, or navigation thereof, and for the purpose of such construction underground shall have the right to open any street or avenue in any incorporated town or city, by and with the consent of the corporate authorities of such town or city, excepting in the city of New York, where such consent shall be obtained from the commissioner of public works, and to convey letters, parcels, packages, mails, messages, merchandise, and property in and through said tubes, for compensation, by means of the pneumatic method of propulsion.

SEC. 2. Any person who shall willfully destroy or injure any of said tubes or any of the articles deposited therein shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not less than one hundred dollars nor more than five hundred dollars, or by imprisonment not less than three nor more than six months, or by both, and shall also forfeit and pay to the said persons or their assigns three times the amount of damages they may sustain by such damage, to be recovered with costs in any court having jurisdiction.

SEC. 3. In case said persons shall so determine they may organize themselves into an association in the manner required and authorized in and by the act entitled "An act to authorize the formation of corporations for manufacturing, mining, mechanical, or chemical purposes," passed on the seventeenth day of February, eighteen hundred and forty-eight, and the amendments thereto, for the purposes stated in section one of this act. The certificate to be executed for the purpose of forming such corporation may be signed and acknowledged by any three or more of said grantees, and upon the formation thereof said corporation shall possess all the powers and privileges conferred by said act, and be subject to all the duties and obligations imposed therein not inconsistent with the provisions of this act.

SEC. 4. The legislature may at any time alter, amend, or repeal this act, and all acts or parts of acts inconsistent with this act are hereby repealed.

(Chap. 977, Laws of 1895.)

AN ACT Supplementary to chapter four hundred of the laws of eighteen hundred and seventy-four entitled "An act to provide for the transmission of letters, parcels, packages, mails, messages, merchandise, and property between the city of New York and the villages, towns, and cities in the vicinity thereof."

Became a law June 7, 1895, with the approval of the governor. Passed, three-fifths being present.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. In addition to the powers, rights, and privileges granted by chapter four hundred of the laws of eighteen hundred and seventy-four, entitled "An act to provide for the transmission of letters, parcels, packages, mails, messages, merchandise, and property between the city of New York and the villages, towns, and cities in the vicinity thereof," the company incorporated under the provisions of said act, known as the Tubular Dispatch Company, shall have the right to use, in addition to compressed air, electricity or any other mechanical method as a motive power.

This act shall take effect immediately.

CHARTER FROM THE STATE OF NEW YORK TO THE NEW YORK MAIL & NEWSPAPER TRANSPORTATION CO.

(Chap. 164, Laws of 1893.)

AN ACT To incorporate the New York Mail and Newspaper Transportation Company.

Approved by the governor March 21, 1893. Passed, three-fifths being present.

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. James S. Metcalfe, Lucien T. Chapman, Warren W. Foster, William O. Inglis, Augustus P. Smith, and their associates, successors, and assigns,

are hereby created a body corporate and politic by the name of the New York Mail and Newspaper Transportation Company, and by that name shall have perpetual succession and may sue and be sued in any court. The general purpose of such corporation shall be, and it is hereby *authorized and empowered, to construct, maintain, and operate pneumatic tubes and other devices for the speedy transmission and delivery of the mails, newspapers, and parcels within and between the cities of this State, and to do the general business of delivery and transmitting the mails, newspapers, and parcels within and between the cities of this State, and to make such charges therefor as it may agree by public or private contract.*

2. The capital stock of said corporation shall be one hundred thousand dollars divided into one thousand shares of one hundred dollars each, and may at any time be increased or diminished by a majority vote of the board of directors with the consent in writing of the stockholders holding a majority of the stock then issued and outstanding. The shares shall be transferred in such manner as shall be prescribed by the by-laws of said corporation. Said corporation may borrow money, incur debts and liabilities, and issue its bonds or obligations therefor in such manner, of what nature, to such amount, at such rates, and on such terms as its board of directors may from time to time by a majority vote direct. The board of directors may secure the payment of the same by mortgaging any part of its real or personal estate, with or without its franchises.

3. The stock, property, and affairs of such corporation shall be managed by a board of directors. The persons named in the first section of this act shall constitute the first board of directors of said corporation, and shall hold their place as such until the second Monday of May, eighteen hundred and ninety-three, and until others shall be elected in their stead. The said persons, or a majority of them, shall meet and organize as such board of directors within ninety days after the passage of this act and adopt by-laws for the regulation of said corporation not inconsistent with this act or with the laws of this State, and said by-laws may be altered, amended, or repealed at any time by a vote of the holders of a majority of the stock, represented in person or by proxy, at any meeting of the stockholders duly called or by a majority vote of the board of directors. On or after the second Monday of May, eighteen hundred and ninety-three, the board of directors of said corporation shall be elected annually at a meeting of the stockholders thereof to be held at such time and place and on such notice as the corporation by its by-laws may designate or appoint. The number of directors after that time shall not be less than three nor more than fifteen, as may be provided by the by-laws to be adopted by said corporation. All vacancies happening in such board shall be filled as may be provided in said by-laws. The officers of the corporation shall be such as the board of directors shall direct, and shall be annually elected by the board of directors.

4. *Said corporation may issue a portion of its original or increased capital stock, not exceeding one-third part thereof, as preferred stock; such preferred stock to entitle the holder thereof to a cumulative preferential dividend out of the surplus earnings, not exceeding eight per centum per annum, but without any other preferential right.* The amount of preferred stock to be issued from time to time, within the limits above fixed and the manner of issuing the same, may be determined and directed by the board of directors of said corporation. Each share of stock, whether preferred or common, shall entitle the holder thereof to one vote at all meetings of stockholders and at all elections of the company. The capital stock of said corporation may be issued or caused to be issued by its directors for money, material, labor, services, or other property actually received for the use and lawful purposes of such corporation, at its fair value, subject to such restrictions as may be provided by the by-laws of said company.

5. *The said corporation is hereby empowered, without other or further authority of law or ordinance, to do any or all of the following: To locate, to construct, to maintain, and to operate tubes, not to exceed three feet in diameter, between the central post offices and the branch post offices, and newspaper offices and postal stations in said cities of this State, by such route or routes as shall be determined by said corporation, and to transmit and to supply power along any or all of its route or routes and to make connections with and between said post offices and buildings in which newspapers are published and other buildings, railways, ferries, and postal stations within and between the cities of this State, and to convey and transport and to deliver the United States mails, newspapers, and parcels; and such corporation shall have the right, and it is hereby*

empowered, to enter upon and take possession of such real property or such right, title, interest, or easement therein as may be necessary or convenient to accomplish the purposes for which this charter is given or in the exercise of the powers herein conferred, which are hereby expressly declared to be a public purpose and their use by said corporation a public use. All such real property, or right, title, interest, or easement therein, shall be purchased of the owner or owners at a price to be mutually agreed upon, or the said corporation shall have the right to acquire the same by condemnation proceedings, as provided by chapter twenty-three, title one, of the code of civil procedure of the State of New York, and acts amendatory thereof or in addition thereto.

6. The said corporation shall pay annually into the treasury of the cities of New York and Brooklyn, on or before October first, in equal parts, share and share alike, a sum equal to three per centum of its gross earnings in said cities for the preceding calendar year, or a sum equal to one dollar for every hundred yards of tubes constructed and operated by it in said cities.

7. Nothing in this act shall be construed to permit such corporation to do a passenger business or to operate a railway or to place or allow to be placed in said tubes, or any of them, any conductor for the transmission of electric currents, except for use as a motive power to operate said tubes, and when not in full operation to transmit and supply the resulting surplus motive power along such route or routes. No such electrical current shall be used for lighting or signaling purposes. Nothing in this act shall be construed to authorize said corporation to open the streets of the city of New York for the purpose of laying pneumatic tubes except with the consent of the mayor or the commissioner of public works of the city of New York, but such consent shall not be necessary for repairs or for connections not to exceed in the length of any connection a distance greater than the length of four city blocks of maximum size.

8. This act shall take effect immediately.

FRANCHISE TO CHICAGO POSTAL PNEUMATIC TUBE CO.

(Granted July 13, 1903.)

AN ORDINANCE Granting to the Chicago Postal Pneumatic Tube Co. certain rights and privileges in regard to pneumatic tubes in the city of Chicago.

Be it ordained by the City Council of the City of Chicago:

GRANT.

SECTION 1. Subject to the terms and conditions of this ordinance there is hereby granted to the Chicago Postal Pneumatic Tube Co., a corporation duly organized and existing under the laws of the State of Illinois, permission and authority to construct, lay, place, maintain, and operate pneumatic tubes, not to exceed two tubes for each route, from place to place, the maximum size of such tubes to be eight (8) inches inside diameter, occupying in cross section, including switches, turnouts, and connections, approximately two hundred and seventy-five (275) square inches, with all suitable switches, turnouts, and connections with such electrical or other connections as are absolutely necessary for the operation of said switches, turnouts, and connections in, through, upon, and under the streets, avenues, alleys, public ways, tunnels, bridges, viaducts, and under the Chicago River and its various branches, within the city of Chicago, said electrical connections not to exceed four wires from the central post-office station to each switch; the rights and privileges granted under this ordinance are upon the express condition that said pneumatic tubes are to be laid on only such streets, avenues, alleys, public ways, tunnels, upon viaducts, and under the Chicago River and its various branches at such points within the city of Chicago as may be necessary to connect the temporary and main post-office buildings in said city with branch post offices, subpostal stations and steam railway stations; said tubes to be constructed of cast iron, steel, or brass capable of withstanding a pressure of one hundred (100) pounds per square inch, the maximum working pressure not to exceed twenty (20) pounds per square inch.

Before any permit shall be issued to open any street, alley, or public way for the installation of tubes under this ordinance a map or plat of the route adopted and streets or alleys to be occupied shall be presented to the city council for its approval, and no permit shall be issued until such plat or plats or map or maps shall be approved by the city council.

USE.

SECTION 2. Said pneumatic tubes with all switches, turnouts, and connections shall be used for the transmission by compressed air, or such other power as may be hereafter authorized, of United States mail only, and for no other purpose whatever, and this grant shall become null and void if said pneumatic tubes be ever used for any other purpose than carrying United States mails.

UNDERGROUND PLANS.

SECTION 3. All such lines of pneumatic tubes shall be placed under ground, except those which must necessarily pass through, over, upon, or under tunnels, railroads, elevated railroads, bridges, or viaducts. Such company shall at all times place and keep on file with the commissioner of public works plans showing the location of each pneumatic tube, switch, turnout, and connection, and upon laying any pneumatic tubes said company shall file with the commissioner of public works a plan showing where each of the same is laid, the location of manholes or other openings to gain access thereto, and each cover of said openings shall have placed thereon the name of said company. Said pneumatic tubes, branches, connections, switches, and other parts shall be laid and constructed along the route as shown on the map or plat approved by the city council, as hereinbefore provided, and in accordance with the plans approved by the commissioner of public works, as hereinbefore provided, and said work shall be done to the satisfaction of the commissioner of public works: *Provided, however,* That when said company shall lay its line or lines of pipes or tubes, or any part thereof, below the surface of the ground or through a tunnel, the same shall be laid in such part of the street, avenue, alley, tunnel, or other public highway as the commissioner of public works shall direct, and without doing permanent injury to any street, avenue, alley, sidewalk, tunnel, or other public place, or in a manner to unnecessarily disturb or interfere with any water pipe, gas pipe, sewer, conduit, subway, or other underground work laid by the said city or any authorized company or corporation. And if, in the opinion of the commissioner of public works, it becomes necessary for the grantee herein to change or remove any water pipe, gas pipe, sewer, conduit, subway, or other underground work laid by the said city or any authorized company or corporation, the said grantee shall change or remove any such underground work entirely at its own expense. Whenever said line or lines of pipes cross any street at an angle, said street shall be repaved or restored by the said company at such width and in such manner as shall be directed by the commissioner of public works, and the material shall be the same as the material of the remaining portion of the street, avenue, or alley in the same block, all such paving to be done at the expense of the said company in a first-class manner, and to the satisfaction of the commissioner of public works.

TIME FOR LAYING TUBES.

SECTION 4. The work of laying said pneumatic tubes and other appliances connected therewith herein authorized shall be begun within six (6) months after the passage of this ordinance, and at least eight (8) miles of double tubes shall be constructed and completed within one year from said passage, and any work for which a permit may be granted under this ordinance at any time hereafter must be completed within one (1) year from the issuance of said permit: *Provided,* That if the said company shall be restrained or prevented from proceeding with the work in laying said tubes, branches, connections, and other appliances connected therewith by order or writ of any court of competent jurisdiction or by the action of the city of Chicago or its duly constituted authorities, the time which said company shall be so delayed shall be added to the time herein prescribed for the completion of said work. The city of Chicago, however, shall have, and it hereby expressly reserves, the right to intervene in any suit or proceeding brought by any person or persons seeking to enjoin, restrain, or in any manner interfere with the prosecution of said construction and in the name of said company move for a dissolution of such injunction or restraining order and for any proper order in such suit in case it shall deem such suit collusive or brought for the purpose of delay or for the purpose of extending the time herein prescribed for the completion of the laying of said pneumatic tubes.

INJURY TO STREETS.

SECTION 5. Said company shall not open, disturb, or encumber more of any street, avenue, alley, or public place at any time than shall be necessary to enable it to proceed with advantage in the laying in any street, avenue, alley, or public place of its said pipes or tubes, nor shall said company permit any such street, avenue, alley, or public place to remain open or encumbered for a longer period than shall be necessary to execute the work for which the same shall have been opened or encumbered and without putting up the necessary barriers and lights so as to effectually prevent the happening of any accident in consequence of such opening or encumbering of such street, avenue, alley, or public place.

REPAIRING STREETS.

SECTION 6. Whenever said corporation shall repair any street, avenue, alley, or public highway it shall put down pavement of such material and quality, and such material shall be the same as the remaining portion of the street, avenue, alley, or public highway in the same block is constructed of and in which said opening is made and in such manner as existed before said street was disturbed. Before a permit shall be granted to said company to open ground in any street, sidewalk, alley, avenue, or public place for any purpose an estimate of the cost of the necessary repairing of said street, sidewalk, alley, avenue, or public place, with a fair additional sum as margin for contingent cost, shall be made by the commissioner of public works, and the said applicant corporation shall deposit the amount so ascertained with the city comptroller, and the permit shall issue to said company only upon the presentation of the comptroller's receipt for the same to the commissioner of public works; such deposit shall remain with the city comptroller for the period of one year, at which time, upon the presentation of a certificate from the commissioner of public works certifying to the satisfactory condition of such restored pavement, said deposit shall be returned to said corporation, and no work of any kind shall be done by said company without a permit from the commissioner of public works. No excavation in any street, avenue, alley, or other public place shall be made without first procuring a permit for that purpose from the commissioner of public works of the said city of Chicago.

CHANGING OR REMOVING TUBES.

SECTION 7. The said company shall, on notice from the commissioner of public works, remove or change any of its pipes or tubes which may be in the way of or interfere with the construction or location of any viaduct, public building, or other public structure or any public or private undertaking or shall interfere with the lowering of the tunnels under the Chicago River.

SUBWAY.

SECTION 8. Whenever the said city of Chicago or the State of Illinois or any person or corporation acting under a franchise from the city of Chicago, in and by which franchise the city of Chicago shall retain and control the right to fix the rentals and conditions for the use of a subway, shall construct or form, or cause to be constructed or formed, into a general subway any street, avenue, alley, or place, or any part or parts thereof, on or through which any such pneumatic tubes authorized by this ordinance shall be located, the said company, on due notice from the mayor or commissioner of public works, shall remove into and occupy said subway, change and maintain its said pipes, tubes, or other appurtenances therein at its own expense, and said company shall comply in every respect with all the laws and ordinances that shall be passed concerning rentals for space in said subway and the general occupancy thereof, and shall pay such rental as shall be provided by said ordinance.

TERM OF GRANT—RIGHT OF PURCHASE.

SECTION 9. The rights and privileges hereby conferred upon said company are granted for the term of twenty (20) years from and after the acceptance of this ordinance. Such rights and privileges are hereby granted on the express condition that at any time after the end of ten (10) years from and after the

acceptance of this ordinance the city of Chicago shall have the right to purchase the entire plant or plants of said company and all its property and effects of every kind or nature within said city of Chicago, either by mutual agreement or at an appraised value, which appraised value shall be ascertained and determined by three competent and disinterested appraisers, who shall have full access to all books, papers, and other documents of said company bearing on or appertaining to the subject, and such appraisers shall be selected in the following manner, to wit: One of said appraisers shall be appointed by the city of Chicago, one by said company, and the two so selected shall choose a third, and if said two appraisers can not agree upon a third, then said third appraiser shall by petition of either party in interest be selected by the chief justice of the circuit court of Cook County, and the said three appraisers, when so chosen, shall within six months after the appointment of the last appraiser make report in writing to the said city of Chicago of the value of the said property. The value of this license or grant is not to be taken into account or considered of any value as against the city of Chicago, and the said city of Chicago shall have the option at any time within one year after the receipt of said report to purchase said plant or plants and property, together with all its appurtenances and equipment, at the aforesaid value so fixed by said appraisers: *Provided, however,* That if said city shall so elect to purchase said plant or plants and property, then said company shall have the right to operate said plant or plants and property and receive the profits therefrom during the time said arbitration is in progress and until the same shall be completed and the purchase price, as fixed by the arbitrators, has been paid.

In the event of the grantee hereunder not receiving the mail-carrying contract from the United States Government at the expiration of any of its contracts with the United States Government, then, and in that event, the city of Chicago shall have the right, and the right is hereby expressly reserved, to require the grantee hereunder to sell to any person, firm, or corporation which shall receive from the United States Government the contract for carrying mails in the city of Chicago by pneumatic tubes, all its plant which may occupy the public streets, alleys, or other public grounds on the same terms and in the same manner as is herein provided for its purchase by said city; and the value of this license or grant is not to be taken into account or considered of any value as against such person, firm, or corporation receiving said contract.

At the expiration of this grant all the tubes of this grantee then in the streets, alleys, or other public grounds shall be and become the absolute property of the city of Chicago, and this grantee hereby, and in consideration of these presents, agrees to convey the said tubes free of all liens or incumbrances, by proper deed of conveyance, to the city of Chicago or to any person, firm, or corporation that may be selected by said city of Chicago.

BOND.

SECTION 10. On the acceptance of this ordinance the grantee shall deposit with the city treasurer the sum of fifty thousand dollars (\$50,000) in cash, or negotiable securities in the sum of \$50,000 to be approved by the comptroller of the city of Chicago, which deposit is for the purpose of guaranteeing the completion of the first eight miles of pneumatic tubes within one year from the passage of this ordinance, as provided for in section 4 hereof, and if the aforesaid provision is complied with then said deposit is to be returned to the grantee; otherwise this money shall be forfeited to the city of Chicago and all the rights and privileges granted hereby shall become null and void. The company shall also file with the city of Chicago a good and sufficient bond, with sureties to be approved by the mayor, in the penal sum of fifty thousand dollars (\$50,000), conditioned that said company shall comply with all the terms and conditions of this ordinance, and shall indemnify and save harmless the city of Chicago against and from any and all liability, damages, decrees, and costs of whatever kind or nature by reason of the passage of this ordinance, and the exercise of any rights and privileges hereby or herein granted. Whenever, in the opinion of the proper officers of said city of Chicago, the said bond may have been impaired by reason of change in the financial condition of the sureties upon the same, the said city of Chicago may require said company within a reasonable time to furnish another bond conditioned in the same manner with such sureties as may be approved by the mayor of said city of Chicago, and in case of failure of said company to furnish said bond after due notice all the rights of such company under this ordinance shall cease and the same shall be void.

PAYMENTS.

SECTION 11. The rights and privileges hereby granted are upon the express condition that the Chicago Postal Pneumatic Tube Company shall pay annually to said city of Chicago for and in consideration of the rights and privileges hereby granted an amount equal to three (3) per cent per annum of the gross revenues and receipts of said company for the first four (4) years of the life of this ordinance, and a sum equal to five (5) per cent per annum of the gross revenues and receipts of said company for the remaining sixteen (16) years of the life of this ordinance. And in addition to said payments the grantee herein shall at the time it constructs its pipe line between Harrison Street on the north and the subpostal station at or near the stockyards on the south, place in the same trench with the pneumatic tubes between said points two (2) vitrified clay conduits three (3) inches in diameter, said conduits to be installed without expense to the city of Chicago and shall become and be the sole property of said city for its sole use. Such payments shall be made in the manner following: At the expiration of one year from the time said company shall commence to distribute mail in the city of Chicago the president or other chief officers of the said company shall file with the comptroller of the city of Chicago a detailed statement under oath showing the amount of gross annual revenue or receipts of said company for the preceding year, and shall at the same time pay to said comptroller the percentage of the annual gross revenues and receipts of said company as hereinabove provided, said respective payments to be made as herein described annually. Such statement, however, shall not be final or binding upon the city, and the comptroller of the city of Chicago or his authorized agent shall at all times, to verify such statement, have the right to examine the books, contracts, and papers of the said company showing the gross receipts of the said company.

WHEN IN FORCE.

SECTION 12. This ordinance shall take effect and be in force from and after its passage and the filing of the bond herein required and the acceptance in writing of this ordinance by the said company: *Provided*, That if the said bond and the said acceptance be not filed with the city clerk within ninety (90) days after the passage and approval hereof, this ordinance shall be void and of no effect.

STATE OF ILLINOIS, *County of Cook, ss:*

I, Fred C. Bender, city clerk of the city of Chicago, do hereby certify that the foregoing is a true and correct copy of a certain ordinance granting certain privileges to the Chicago Postal Pneumatic Tube Co., now on file at my office, which ordinance was passed by the city council of the city of Chicago, aforesaid, on the 13th day of July, A. D. 1903, and deposited in my office on the 13th day of July, A. D. 1903.

I do further certify that the said ordinance was delivered to the mayor of said city, after the passage of said ordinance by the city council, without delay, by the city clerk of said city; and that the said mayor failed to return the same to the said council at its next regular meeting, occurring more than five days after the passage of said ordinance, with his objections thereto, whereupon the said ordinance took effect in like manner as if he had approved the same.

I do further certify that the original, of which the foregoing is a true copy, is entrusted to my care for safekeeping, and that I am the keeper of the same.

In witness whereof I have hereunto set my hand and affixed the corporate seal of the city aforesaid, at the said city, in the county and State aforesaid, this 21st day of July, A. D. 1903.

[SEAL.]

FRED C. BENDER, *City Clerk*.

AMENDMENT TO FRANCHISE TO CHICAGO POSTAL PNEUMATIC TUBE CO. (GRANTED JUNE 1, 1909).

AN ORDINANCE Amending sections 1, 4, and 9 of an ordinance granting to the Chicago Postal Pneumatic Tube Co. certain rights and privileges in regard to pneumatic tubes in the city of Chicago.

Be it ordained by the City Council of the City of Chicago:

SECTION I. That sections 1, 4, and 9 of an ordinance granting to the Chicago Postal Pneumatic Tube Company certain rights and privileges in regard to

pneumatic tubes in the city of Chicago, passed July 13, 1903, be, and the same are hereby, amended so as to read, respectively, as follows:

SECTION 1. Subject to the terms and conditions of this ordinance, there is hereby granted to the Chicago Postal Pneumatic Tube Company, a corporation duly organized and existing under the laws of the State of Illinois, permission and authority to construct, lay, place, maintain, and operate pneumatic tubes, not to exceed two tubes for each route from place to place, the maximum size of such tubes to be eight (8) inches inside diameter occupying in cross section, including switches, turn-outs, and connections, approximately two hundred and seventy-five (275) square inches, with all suitable switches, turn-outs, and connections, with such electrical or other connections as are absolutely necessary for the operation of said switches, turn-outs, and connections in, through, upon, and under the streets, avenues, alleys, public ways, tunnels, bridges, viaducts, and under the Chicago River and its various branches within the city of Chicago, said electric connections not to exceed four wires from the central post-office station to each switch; the rights and privileges granted under this ordinance are upon the express condition that said pneumatic tubes are to be laid on only such streets, avenues, alleys, public ways, tunnels, upon viaducts, and under the Chicago River and its various branches at such points within the city of Chicago as may be necessary to connect the temporary and main post-office buildings in said city with branch post offices, subpostal stations, and steam railway stations, said tubes to be constructed of cast iron, steel, or brass, capable of withstanding a pressure of one hundred (100) pounds per square inch, the maximum working pressure not to exceed twenty (20) pounds per square inch; and said company is further authorized to construct, maintain, and operate but, excepting as hereinafter provided, subject to the provisions of its ordinance of July 13, 1903, under the Chicago River a tunnel having a cross section not greater than five (5) feet inside diameter and whose crown shall not be less than thirty-six (36) feet below city datum along the following-described route, to wit:

Beginning about the north line of South Water Street at a point about twenty (20) feet east of the west line of Fifth Avenue, running thence north sixteen (16) degrees west for a distance of about ninety-seven (97) feet to a point forty-six (46) feet and three (3) inches west of the center line of Fifth Avenue or Wells Street; thence north on a line parallel with and about forty-six (46) feet three (3) inches west of the center line of Fifth Avenue or Wells Street about two hundred and ten (210) feet; thence north about eleven (11) degrees and fifteen (15) minutes, east about one hundred, thirty-seven and five-hundredths (137.05) feet to a point about twenty (20) feet east of the west line of Fifth Avenue or Wells Street; thence north on a line parallel with the center line of Fifth Avenue or Wells Street and about twenty (20) feet east of the west line of Fifth Avenue or Wells Street about one hundred and fifty-two (152) feet, as shown on the blue print attached hereto, which for greater certainty is hereby made a part of this ordinance; such tunnel to be constructed according to the plans and specifications approved by the commissioner of public works.

Before any permit shall be issued to open any street, alley, or public way for the installation of tubes under this ordinance a map or plat of the route adopted and streets or alleys to be occupied shall be presented to the city council for its approval, and no permit shall be issued until such plat or plats or map or maps shall be approved by the city council.

SEC. 4. The work of laying said pneumatic tubes and other appliances connected therewith, herein authorized, shall be begun within six (6) months after the passage of this ordinance, and at least eight (8) miles of double tubes shall be constructed and completed within one year from said passage, and any work for which a permit may be granted under this ordinance at any time hereafter must be completed within one (1) year from the issuance of said permit (excepting the work herein authorized by this amendatory ordinance in favor of the grantee herein, which said work shall be begun within forty (40) days after the passage of said amendatory ordinance and must be completed within one hundred twenty (120) days from the issuance of the permit therefor); provided, that if the said company shall be restrained or prevented from proceeding with the work in laying said tubes, branches, connections, and other appliances connected therewith, or the construction of said tunnel, by order or writ of any court of competent jurisdiction, or by the action of the city of Chicago or its duly constituted authorities, the time which said company shall

be so delayed shall be added to the time herein prescribed for the completion of said work. The city of Chicago, however, shall have, and it hereby expressly reserves, the right to intervene in any suit or proceeding brought by any person or persons seeking to enjoin, restrain, or in any manner interfere with the prosecution of said construction and in the name of said company move for a dissolution of such injunction or restraining order and for any proper order in such suit in case it shall deem such suit collusive or brought for the purpose of delay or for the purpose of extending the time herein prescribed for the completion of said pneumatic tubes or construction of said tunnel.

SEC. 9. The rights and privileges hereby conferred shall cease and determine October 13, 1923. Such rights and privileges are hereby granted on the express condition that at any time after October 13, 1913, the city of Chicago shall have the right to purchase the entire plant or plants of said company and all its property and effects of every kind and nature within said city of Chicago, either by mutual agreement or at an appraised value, which appraised value shall be ascertained and determined by three competent and disinterested appraisers, who shall have full access to all books, papers, and other documents of said company bearing on or appertaining to the subject, and such appraisers shall be selected in the following manner, to wit: One of said appraisers shall be appointed by the city of Chicago, one by said company, and the two so selected shall choose a third, and if said two appraisers can not agree upon a third, then said third appraiser shall by petition of either party in interest, be selected by the chief justice of the circuit court of Cook County, and the three appraisers, when so chosen, shall within six months after the appointment of the last appraiser make report in writing to the said city of Chicago of the value of the said property; the value of this license or grant is not to be taken into account or considered of any value as against the city of Chicago, and the said city of Chicago shall have the option at any time within one year after the receipt of said report to purchase said plant or plants and property, together with all its appurtenances and equipment at the aforesaid value so fixed by said appraisers: *Provided, however,* That if said city shall so elect to purchase said plant or plants and property, then said company shall have the right to operate said plant or plants and property and receive the profits therefrom during the time said arbitration is in progress and until the same shall be completed and the purchase price, as fixed by the arbitrators, has been paid.

In the event of the grantee hereunder not receiving the mail-carrying contract from the United States Government at the expiration of any of its contracts with the United States Government, then, and in that event, the city of Chicago shall have the right, and the right is hereby expressly reserved, to require the grantee hereunder to sell to any person, firm, or corporation which shall receive from the United States Government the contract for carrying mails in the city of Chicago by pneumatic tubes, all its plant which may occupy the public streets, alleys or other public grounds, together with said tunnel (and tubes or conduits located therein) constructed and maintained or operated under the Chicago River, on the same terms and in the same manner as is herein provided for its purchase by said city, and the value of this license or grant is not to be taken into account or considered of any value as against such person, firm, or corporation receiving said contract.

At the expiration of this grant all the tubes of this grantee then in the streets, alleys, or other public grounds, together with said tunnel (and tubes or conduits located therein) constructed or maintained or operated under the Chicago River shall be and become the absolute property of the city of Chicago, and this grantee hereby and in consideration of these presents agrees to convey the said tubes and tunnel (and tubes and conduits located therein) free of all liens or incumbrances by proper deed of conveyance to the city of Chicago, or to any person, firm, or corporation that may be selected by said city of Chicago.

SEC. 2. This ordinance shall be in full force from and after its acceptance by the said Chicago Postal Pneumatic Tube Company, and the filing of the consent of the surety or sureties upon the bond of said Chicago Postal Pneumatic Tube Company, which acceptance and consent shall be filed with the city clerk of the city of Chicago within thirty (30) days from the passage hereof: *Provided, however,* That in the event that such acceptance and consent is not filed within thirty (30) days, then all the rights and privileges hereby granted shall be held void and of no effect.

STATE OF ILLINOIS, *County of Cook, ss:*

I, Francis D. Connery, city clerk of the city of Chicago, do hereby certify that the foregoing is a true and correct copy of a certain ordinance amending an ordinance passed July 13, 1903, granting certain rights and privileges to the Chicago Postal Pneumatic Tube Co., now on file at my office, which ordinance was passed by the city council of the city of Chicago aforesaid, on the 1st day of June, A. D. 1909, and deposited in my office on the 1st day of June, A. D. 1909.

I do further certify that the said ordinance was delivered to the mayor of said city after the passage of said ordinance by the city council without delay by the city clerk of said city, and that the said mayor failed to return the same to the said council at its next regular meeting, occurring not less than five days after the passage of said ordinance, with his objections thereto, whereupon the said ordinance took effect in like manner as if he had approved the same.

I do further certify that the original, of which the foregoing is a true copy, is intrusted to my care for safe-keeping and that I am the keeper of the same.

In witness whereof I have hereunto set my hand and affixed the corporate seal of the city aforesaid at the said city, in the county and State aforesaid, this 29th day of June, A. D. 1909.

FRANCIS D. CONNERY, *City Clerk.*

[SEAL—CITY OF CHICAGO.]

FRANCHISE TO ST. LOUIS PNEUMATIC TUBE CO.

AN ORDINANCE To authorize the St. Louis Pneumatic Tube Company to lay and maintain pneumatic tubes, with necessary appurtenances, to be used for the purpose of transmitting the United States mail in and under certain streets in the city of St. Louis.

Be it ordained by the Municipal Assembly of the City of St. Louis as follows:

SECTION 1. The St. Louis Pneumatic Tube Company is hereby granted the power and is authorized to lay and maintain pneumatic tubes, with the necessary manholes and switches, to be used for the purpose of transmitting the United States mail under contract made with the United States, in and under the following-named streets of St. Louis: Locust Street from Ninth Street to Third Street; Third Street from Locust Street to Olive Street; Olive Street from Second Street to Third Street; Ninth Street from Washington Avenue to Pine Street; Pine Street from Ninth Street to Twentieth Street; Nineteenth Street from Pine Street to Olive Street; Nineteenth Street from Pine Street to Market Street; Twentieth Street from Pine Street to Clark Avenue; Washington Avenue from Ninth Street to Third Street.

The pneumatic tubes herein authorized shall be used exclusively for the transmission of United States mail. The said work shall be begun within ninety days of the approval of this ordinance and shall be completed within twelve months thereafter.

A discontinuance or abandonment of the use of said pneumatic tubes for the transmission of mail by the United States Government for a period of one year shall cause a forfeiture of all the rights, privileges, and franchises herein granted.

SEC. 2. The St. Louis Pneumatic Tube Company, in performing said work and maintaining said tubes, shall comply in all respects with the requirements of the Revised Ordinances of the City of St. Louis and all amendments thereof, and its work shall be subject to the supervision and control of the board of public improvements.

The city of St. Louis shall, at all times, through the board of public improvements, have the right to inspect, superintend, and control the construction of the tubes and other appurtenances constructed under this ordinance, and the city reserves the right from time to time to order any changes to be made either in the construction, material, or manner of maintaining same, or in the location in the street. All such changes or alterations shall be made by the St. Louis Pneumatic Tube Company without expense to the city, and if the said company fails to comply with any ordinance directing such changes, within such time as may be specified therein, then said board may cause such changes or alterations to be made by the city, and the company owning the pipes or other appurtenances so changed or altered shall pay the costs thereof on demand by the city comptroller.

Failure to make such payment when so demanded shall constitute a breach of the bond as provided for in the next succeeding section.

SEC. 3. This ordinance shall not take effect unless within ninety days from the date of its approval the company shall file with the city register its written acceptance of the terms and conditions of this ordinance and its agreement to be bound thereby, and file the penal bond of said company in such form as shall be approved by the city counsellor in the sum of fifty thousand dollars, with two or more good and sufficient securities, to be approved by the mayor and council, conditioned that the said company will observe and comply with all the terms and conditions of this ordinance and conditioned that said company shall hold the city of St. Louis harmless from all damages arising from the construction or maintenance of said pneumatic tubes.

And if at any time said bond shall be impaired by recovery thereon in any court of competent jurisdiction or by reason of the death or insolvency of any of the sureties thereon, then and in such event said St. Louis Pneumatic Tube Company shall renew said bond so that at all times the sum thereof shall be fifty thousand dollars, with surety as aforesaid and all renewals of said bond shall be made within twenty days after notice in writing by the mayor.

Any failure to comply with the provisions of this section by said St. Louis Pneumatic Tube Company shall work a forfeiture of all rights and privileges herein granted.

SEC. 4. In consideration of the privileges granted in this ordinance, the said St. Louis Pneumatic Tube Company, for itself, its successors, and assigns, agrees to and binds itself to make on the first Monday in January, nineteen hundred and four, and also on the same day in each year thereafter during the duration of this franchise, which shall be twenty-five years, an annual statement of its gross earnings. Said statement to be sworn to by its president and secretary, and also, upon the said designated days, to pay into the city treasury, for the sole use and benefit of the said city of St. Louis, a sum of money equal to five per cent on the said gross receipts.

The comptroller of the city of St. Louis shall have the right, at his discretion, to inspect the books of said company so far as the same bear on the amount of its gross receipts.

Approved, June 10, 1903.

(By the city of Philadelphia.)

AN ORDINANCE Regulating the laying and construction of underground wires, electrical conductors, conduits, cables, and tubes in the city of Philadelphia.

SECTION 1. *The select and common councils of the city of Philadelphia do ordain.* That every company, corporation, firm, or individual desiring to lay or construct a line or lines of telegraph, telephone, electric-light wires, electrical conductors, conduits, cables, or pneumatic tubes under any of the streets or highways of the city shall first file with the board of highway supervisors an application in writing, accompanied by a general plan and specification, showing the location of the proposed work, and so far as shall be practicable that of all structures existing under said streets or highways upon which they may desire to lay or construct their line or lines of wires, electrical conductors, conduits, cables, or tubes.

SEC. 2. In order to avoid the placing of unnecessary wires, electrical conductors, conduits, cables, or tubes on streets or highways already occupied by such, and to avoid interference with the water, gas, and sewerage system of the city, the board of highway supervisors shall have authority to alter and change the route or plans submitted by any company, corporation, firm, or individual, as they may think for the best interests of the city, and, upon the approval of a route and plan by the said board of highway supervisors, they shall cause said route and requirements to be drafted into the form of an ordinance to be submitted to councils for their approval or disapproval. The said ordinance shall be accompanied by plans approved by the board of highway supervisors.

SEC. 3. The board of highway supervisors are hereby authorized, upon the passage of a resolution by councils, to grant permission to any company, corporation, firm, or individual to which privileges have been or may hereafter be granted for the construction of main lines of telegraph, telephone, electric-light wires, electrical conductors, conduits, cables, or pneumatic tubes, to lay or build branch lines therefrom not extending beyond three squares direct from the main lines, which privilege shall be revocable at any time by councils.

SEC. 4. The laying, construction, and maintenance of all wires, electrical conductors, conduits, tubes, or cables shall be under the supervision of the chief of the electrical department and subject to his approval; and the same shall be laid under the rules and regulations of the board of highway supervisors.

SEC. 5. That every company, corporation, firm, or individual to which privileges have been or may hereafter be granted for the laying or construction of a line or lines of wires, electrical conductors, conduits, cables, or tubes shall be liable for any injury or damages to gas, water mains, pipes, or sewers by the opening of the streets or the laying of their wires, electrical conductors, conduits, cables, or tubes therein, and this condition shall be set forth in the bond provided for in section 11 of this ordinance.

SEC. 6. That whenever the city may desire to use or occupy any of the wires, electrical conductors, or cables for municipal purposes, the company, corporation, firm, or individual to which the privilege has or shall hereafter be granted for laying or constructing such lines or branches shall furnish three good working wires, upon thirty (30) days' notice to the electrical department, without any cost to the city.

SEC. 7. That whenever the city may desire to occupy or use a tube or chamber in any of the conduits or tubes which have heretofore been or may hereafter be laid by authority of councils, the company, corporation, firm, or individual owning such conduits or tubes shall, upon thirty (30) days' notice from the chief of the electrical department, furnish said department, free of cost or charge to the city, at least one tube or chamber in such conduits or tubes: *Provided*, That this section shall not be construed to apply to companies, corporations, firms, or individuals laying wires who have complied with section 6 of this ordinance, of which compliance the chief of the electrical department shall be judge.

SEC. 8. That every company, corporation, firm, or individual to which privileges have been granted for the laying of pneumatic tubes shall, upon notice from the chief of the electrical department, supply free service to the city of Philadelphia and the departments thereof between such points as are or may be reached by their system.

SEC. 9. Every company, corporation, firm, or individual to which privileges have heretofore or may hereafter be granted for the laying of wires, electrical conductors, conduits, cables, or tubes under any of the streets or highways of the city shall, on or before the first Monday of November in each and every year, certify under oath to the chief of the electrical department the number and location of wires, electrical conductors, conduits, cables, or tubes and the miles of wire laid underground by authority of ordinance. Upon failure to make such a return on the part of any company, corporation, firm, or individual within thirty days from the time specified, the privileges granted by this or any other ordinance, or by the board of highway supervisors under any resolution of councils, shall cease and determine, and the chief of the electrical department shall thereupon cause the wires, electrical conductors, conduits, cables, or tubes to be either disconnected from the buildings or removed from the streets, and any expense or cost resulting therefrom shall be charged to and against such company, corporation, firm, or individual, and the city solicitor is directed and authorized to collect the cost from such company, corporation, firm, or individual for said disconnection or removal by proceeding upon the bond as required to be given by them, as provided in section 11 of this ordinance. And should the amount of said bond be insufficient to cover the costs and charges, he is further authorized and directed to take other proceedings to recover the same.

SEC. 10. The chief of the electrical department shall at all times have free and unobstructed access to the wires, conduits, cables, electrical conductors, or tubes for the purpose of inspecting the same or making connections therewith for wires or conductors in use or to be used by the city.

SEC. 11. That upon the passage of an ordinance granting any company, corporation, firm, or individual privileges under this ordinance, or any ordinance now in force or to be hereafter passed, relating to or regulating underground wires, electrical conductors, conduits, cables, pipes, or tubes, the said company, corporation, firm, or individual shall, before exercising any privileges thereunder, give a bond, to be drawn and approved by the city solicitor, and to be entered of record, in the sum of five thousand (5,000) dollars, conditioned that they will properly relay and pave all openings made by them, and thereafter keep in repair for a period of three years the paving over said openings, and that they

will comply with the provisions of section 5 of this ordinance for a like period of three years. And a certificate of such approval shall be furnished by the city solicitor to the board of highway supervisors before a permit shall be issued for the opening of any street or highway for the purpose named; and the company, corporation, firm, or individual to which any privilege is granted shall, before the issuance of a permit, pay fifty (50) dollars to the city treasurer for printing of the ordinance granting the privileges asked.

SEC. 12. Should any company, corporation, firm, or individual to which privileges have heretofore or shall hereafter be granted for the laying of underground wires, electrical conductors, conduits, cables, or tubes dispose of any of the franchises granted by ordinance, or lease to, consolidate, or merge with any other company, corporation, firm, or individual, they shall forfeit all rights and privileges granted to them by the city of Philadelphia, and upon satisfactory proof being furnished to the chief of the electrical department and the city solicitor, they are hereby authorized and directed to take similar action against the offending company, corporation, firm, or individual, as provided for in section 9 of this ordinance.

SEC. 13. All ordinances providing for license charges upon underground wires, electrical conductors, conduits, cables, or tubes, as well as all other ordinances or parts of ordinances inconsistent herewith be, and the same are hereby, repealed.

Approved the fifth day of August, A. D. 1886.

WILLIAM B. SMITH,
Mayor of Philadelphia.

STATISTICS OF THE SERVICE PERFORMED
ON PNEUMATIC-TUBE ROUTES

IN THE CITIES OF NEW YORK, BROOKLYN, PHILADELPHIA,
CHICAGO, BOSTON, AND ST. LOUIS, REPORTED
BY THE RESPECTIVE POSTMASTERS

STATISTICS OF THE SERVICE PERFORMED ON PNEUMATIC-TUBE ROUTE 507003, CITY OF BROOKLYN, N. Y., FOR PERIOD FROM MARCH 2 TO 8, 1913, INCLUSIVE.

1	2	3	4	5	6	7	8	9	10				11				12		13						14				15				16				17		18
From—	To—	Dis- tance.	Popula- tion served latter point.	Postal revenue year ended June 30, 1912, latter point.	Num- ber of clerks latter point.	Num- ber of car- riers latter point.	Trips of collec- tion latter point.	Trips of deliv- ery latter point.	Mails received at latter point.				Mails dispatched at latter point.				Actually advanced by tube.		Number of trips.						Tube.				Tube inadequacy when volume of mail is too great for tube.				All mails.				All special delivery.		Local mail originating in district at latter point for delivery same city.
									First class.		Other classes.		First class.		Other classes.																								
									Tube.	Other means.	Tube.	Other means.	Tube.	Other means.	Tube.	Other means.																							
									Tube.	Other means.	Tube.	Other means.	First class.	Other classes.	Trips.	Time in transit.	Speed per hour.	Trips.	Time in transit.	Speed per hour.	Contract capa- city based on 15 seconds head- way, 20-hour day.	Carriers sent in one day.	Greatest number carriers sent one hour.	Capacity utilized (per cent).	From—	To—	Pieces first class sent other means.	Per- cent- age.	Collected at latter point.		Delivered from latter point.		Mailed at latter point.	Delivered from latter point.					
First class.	Other classes.	First class.	Other classes.	First class.	Other classes.	Trips.	Time in transit.	Speed per hour.	Trips.	Time in transit.	Speed per hour.	Contract capacity based on 15 seconds headway, 20-hour day.	Carriers sent in one day.	Greatest number carriers sent one hour.	Capacity utilized (per cent).	From—	To—	Pieces first class sent other means.	Per-centage.	First class.	Other classes.	First class.	Other classes.	Mailed at latter point.	Delivered from latter point.														
General post office.	Station L.	1.35	64,403	\$204,953	19	50	10	5	830,520	106,434	3,255	269,220	437,778	\$3,106	1,127	102,515	All, 1,268,298 both ways.	4,382	4,083	2 min. 41 sec.	Miles. 30	170	15 min..	Miles. 4.64	9,600 a day in both directions or 4,800 in each direction.	731 in both directions.	51	7½	Hours. None.	Hours. None.	None.	None.	198,802 Collected at 10 contributory stations, 517,146.	34,979 Collected at 10 contributory stations, 102,799.	268,999 Delivered at 10 contributory stations, 1,009,053.	66,813 Delivered at 10 contributory stations, 227,583.	505 Mailed at 10 contributory stations, 909.	576 Delivered at 10 contributory stations, 1,981.	122,330 Originating at 10 contributory stations for local delivery in city, 276,107.

78419—13 (To follow page 379.) No. 2.

Contributory stations.	Population of adjacent territory fed by tube.	Revenue from stations fed by tube.	Number of clerks.	Number of carriers.	Trips of collection.	Trips of delivery.
Flatbush station	56,600	\$77,083	13	52	7 to 10 trips are performed...	4 trips are made.
Vandever station.....	23,167	14,801	5	24		
Station V	120,221	129,826	16	54		
Station C	86,649	106,275	16	52		
Fort Hamilton station	20,181	14,932	3	13		
Station Y	39,596	20,803	7	33		
Bath Beach station.....	27,100	21,159	5	16		
Blythebourne station.....	35,911	36,785	6	25		
Coney Island station	10,328	29,664	4	7		
Sheepshead Bay station.....	10,160	8,203	3	10		
Total.....	429,913	459,831	78	286		

STATEMENT OF THE SERVICE PERFORMED ON PNEUMATIC-TUBE ROUTE NO. 510006, CITY OF PHILADELPHIA, PA., FOR PERIOD FROM MARCH 2 TO 8, 1913, INCLUSIVE.

1	2	3	4	5	6	7	8	9	10				11				12		13						14				15				16				17		18			
From—	To—	Distance.	Population served, year ended June 30, 1912, latter point.	Postal revenue, year ended June 30, 1912, latter point.	Number of clerks, latter point.	Number of carriers, latter point.	Trips of collection, latter point.	Trips of delivery, latter point.	Mails received at latter point.				Mails dispatched at latter point.				Actually advanced by tube.		Number of trips.						Tube.				Tube inadequacy when volume of mail is too great for tube.				All mails.				All special delivery.		Local mail originating at latter point for delivery same city.			
									First class.		Other class.		First class.		Other class.		First class.	Other class.	By tube.			Trips by trolley.	By wagon.			Contract capacity based on 15 seconds headway, 20-hour day.	Carriers sent in 1 day.	Greatest number carriers sent in 1 hour.	Capacity utilized, per cent.	From—	To—	Pieces first class sent other means.	Per centage.	Collected at latter point.		Delivered from latter point.		Mailed at latter point.		Delivered from latter point.		
									Tube.	Other means.	Tube.	Other means.	Tube.	Other means.	Tube.	Other means.			First class.	Other class.	Trips.		Time in transit.	Speed per hour.	Trips.									Time in transit.	Speed per hour.	First class.	Other class.				First class.	Other class.
																		Min. sec.	Miles.			Min.	Miles.							Hours.	Hours.											
Central.....	Central.....	0.7267	245,961	\$1,617,347.88	903	244	22	6	86,975	67,557	2,129	651,965	93,072	85,152	22,123	2,400,454	34,790	852	22,772	1 27	30	26	70	06	8.88	4,800	3,253	243	0.678					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922		
Penn Square.....	Penn Square.....	.7267	245,961	1,617,347.88	52	244	22	6	7,405	2,285			53,700	3,971			2,526		16,003	1 27	30	26	70	06	8.88	4,800	2,286	233	.476					20,559	4,142			2,360		7,394		
Central.....	Reading Terminal.....	.2785	245,961	1,617,347.88	9	244	22	6	51,409	1,324			57,585		9,389		17,126		22,772	1 27	30	26	70	06	8.88	4,800	3,253	243	.678					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922		
Reading.....	Central.....	.2785	245,961	1,617,347.88	11	244	22	6	5,440	1,916			16,832	2,480		5,597	420		4,732	1 34	30		35	05	8.88	4,800	674	77	.140					2,355	1,558			320		1,172		
Central.....	Bourse.....	.56	245,961	1,225,546.88	11	244	22	6	11,379				10,654				3,793		4,732	1 34	30		35	05	8.88	4,800	676	63	.141					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922		
Bourse.....	Central.....	.56	245,961	1,617,347.88	903	244	22	6	225	106			13,455	5,315			31,326		4,365	1 07	30		19	07	8.88	4,800	727	251	.151					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922		
Central.....	Station S.....	1.411	83,300	91,327.38	22	49	4	4	13,455	5,315			31,326	106			1,560		4,365	1 07	30		19	07	8.88	4,800	727	251	.151	6 p. m.	7 p. m.	26,575	3.8	79,253	1,923,809	58,302	127,493	4,890	5,159	60,922		
Station S.....	Central.....	1.411	245,961	1,617,347.88	903	244	22	6	5,077	1,022	2,291	7,740	1,883	134	133	7,576	1,833	133	7,245	2 49	30		9		08	8.88	4,800	1,000	117	.221					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922	
Do.....	Station O.....	1.21	98,517	81,452.35	19	47	9	4	13,483		43		16,778		8,553				5,753	2 23	30		9		08	8.88	4,800	821	94	.171					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922	
Station O.....	Station S.....	1.21	83,300	91,327.38	22	49	4	4	3,750	1,058	1,626	4,512	2,863	630	381	4,878	6,335	1,715	5,118	2 23	30		2		10	8.88	4,800	731	104	.152					4,129	160	5,128	3,827	266	398	1,707	
Do.....	Fairhill.....	1.175	102,350	91,487.32	19	47	9	4	3,184	471	1,565	2,599	2,856	65	36	3,919	6,140	1,607	4,658	2 21	30		2		09	8.88	4,800	665	74	.136					1,716	3,861	5,654	8,737	77	156	903	
Fairhill.....	Station O.....	1.175	98,517	81,452.35	19	47	9	4	284				48		48		284		4,094	2 23	30		2		10	8.88	4,800	584	104	.122					4,129	160	5,128	3,827	266	398	1,707	
Do.....	North Philadelphia.....	.623	85,591	50,805.88	23	38	8	4	401	45	43		337		65		666		4,589	2 21	30		2		09	8.88	4,800	655	87	.136					2,921	4,005	3,755	4,164	83	190	1,433	
North Philadelphia.....	Fairhill.....	.623	102,350	91,487.32	19	47	9	4	9,053	22,663	784	35,992	19,379	11,229	5	42,403	28,432	789	3,369	1 15	30		9		02	8.88	4,800	481	69	.100					4,129	160	5,128	3,827	266	398	1,707	
Penn Square.....	Station J.....	1.2457	66,271	67,722.99	14	33	9	4	593	87	265	2,149	1,248	40	25	4,143	1,901	90	3,264	1 5	30		9		02	8.88	4,800	466	83	.097					3,797	8,995	5,049	7,966	256	418	1,690	
Station J.....	Penn Square.....	1.2457	245,961	1,617,347.88	52	244	22	6	3,423	513	2,716	5,720	3,370	25	516	3,786	1,234	778	3,709	2 29	30		6		09	8.88	4,800	529	51	.110					1,428	4,469	680	1,914	82	121	357	
Do.....	Station C.....	.8825	120,000	38,294.39	18	55	8	4	3,116				1,572				3,855		3,769	2 29	30		6		09	8.88	4,800	538	51	.112					3,451	3,134	4,099	8,082	306	374	1,465	
Station C.....	Station J.....	.8825	66,271	67,722.99	14	33	9	4	4,822	618	4,111	7,502	3,855	8	614	2,443	3,969	3,044	1,541	1 46	30		6		06	8.88	4,800	220	27	.046					20,559	4,142			2,560		7,394	
Central.....	Southwark.....	1.0155	128,820	53,533.15	14	46	3	4	152		10		161		65		80		1,599	1 46	30		6		06	8.88	4,800	228	27	.048					2,627	2,009	2,792	2,485	369	572	2,003	
Southwark.....	Central.....	1.0155	245,961	1,617,347.88	903	244	22	6	2,514	477	1,017	4,576	573	1,455	483	1,612	331	555	3,117	2 01	30		10		10	8.88	4,800	445	59	.090					3,451	3,134	4,099	8,082	306	374	1,465	
Do.....	Station D.....	.872	180,000	32,796.74	18	64	8	4	1,789	554			4,990		4,315				2,715	2 01	30		10		10	8.88	4,800	387	57	.081					2,140	947	3,175	2,718	177	600	449	
Station D.....	Southwark.....	.872	128,820	53,533.15	14	46	3	4	3,996	546	2,948	8,543	1,563	372		3,546	1,549	1	1,518	1 44	30		10		24	8.88	4,800	216	27	.045					79,253	1,923,809	58,302	127,493	4,890	5,159	60,922	
									396	50	45	450	340		51		340	51	2,391	1 44	30		10		24	8.88	4,800	341	37	.071					1,952	2,512	2,432	1,655	221	572	767	
																																				2,140	947	3,175	2,718	177	600	449

STATISTICS OF THE SERVICE PERFORMED ON PNEUMATIC-TUBE ROUTE 535004, CHICAGO, ILL., FOR PERIOD FROM MARCH 9 TO 16, 1913, INCLUSIVE.

1	2	3	4	5	6	7	8	9	10				11				12		13						14				15				16				17		18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
									Mails received at latter point.				Mails dispatched at latter point.				Actually advanced by tube.		Number of trips.						Tube.				Tube inadequacy when volume of mail is too great for tube.				All mails.				All special delivery.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
									First class.		Other classes.		First class.		Other classes.		First class.	Other classes.	By tube.			By wagon.			Contract capacity based on 15 seconds headway, 20-hour day.	Carriers sent in one day.	Greatest number carriers sent in one hour.	Capacity utilized, per cent.	From—	To—	Pieces first class sent by other means.	Percent-age.	Collected at latter point.		Delivered from latter point.		Mailed at latter point.	Delivered from latter point.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
									Tube.	Other means.	Tube.	Other means.	Tube.	Other means.	Tube.	Other means.			Trips.	Time in transit.	Speed per hour.	Trips.	Time in transit.	Speed per hour.									First class.	Other classes.	First class.	Other classes.				First class.	Other classes.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
From—	To—	Dis-tance.	Popula-tion served, latter point.	Postal revenue year ended June 30, 1912, latter point.	Number of clerks at latter point.	Number of car-riers, lat-ter point.	Trips of col-lections, latter point.	Trips of delivery, latter point.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

STATISTICS OF THE SERVICE PERFORMED ON PNEUMATIC TUBE ROUTE NO. 504003, CITY OF BOSTON, MASS., FOR PERIOD FROM MARCH 2 TO 8, 1913, INCLUSIVE.

[illegible]

¹ The pneumatic tubes are adequate at all times to handle mails which can advantageously be dispatched thereby. At the South Station several railway post-office trains bringing heavy mails to Boston arrive on a track at the opposite side of the station from the tube room. Because of this fact, and also because of the numerous separations these railway post offices make, it is convenient to have a wagon waiting at the track of arrival and to bring the mails direct to the general post office by wagon.

Carriers sent 15 seconds headway 20 hours per day.

Carriers sent 30 seconds headway 20 hours per day.

STATISTICS OF THE SERVICE PERFORMED ON PNEUMATIC-TUBE ROUTE 545002, CITY OF ST. LOUIS, MO., FOR PERIOD FROM MARCH 2 TO 8, 1913, INCLUSIVE.

1	2	3	4	5	6	7	8	9	10				11				12		13						14				15				16				17		18
From—	To—	Dis- tance.	Popu- lation served, latter point.	Postal rev- enue, year ended June 30, 1912, latter point.	Number of clerks, latter point.	Number of car- riers, lat- ter point.	Trips of collec- tion (per day), lat- ter point.	Trips of delivery (per day), latter point.	Mails received at latter point.				Mails dispatched at latter point.				Actually ad- vanced by tube.		Number of trips.						Tube.				Tube inadequacy when volume of mail is too great for tube. ²				All mails.				All special delivery.		Local mail originating in district at latter point for delivery, same city.
									First class.		Other classes.		First class.		Other classes.		First class.	Other classes.	By tube.			By wagon.			Contract capacity based on 15 seconds headway, 20-hour day.	Carriers sent in one day.	Greatest number carriers sent one hour.	Capacity utilized, per cent.	From—	To—	Pieces, first class, sent other means.	Per- cent- age.	Collected at latter point.		Delivered from latter point.		Mailed at latter point.	Delivered from lat- ter point.	
									Tube.	Other means.	Tube.	Other means.	Tube.	Other means.	Tube.	Other means.			Trips.	Time in transit.	Speed per hour.	Trips.	Time in transit.	Speed per hour.									First class.	Other classes.	First class.	Other classes.			
General post office.....	Central station.....	Miles. 1.438	54,562	(¹)	33	55	15	5 and 6	Pounds. 17,184	Pounds. 1,630	Pounds. 891	Pounds. 46,738	Pounds. 15,350	Pounds. 2,089	Pounds. 4,567	Pounds. 41,014	Pounds. 595	Pounds. 891	7,956	Min. 3 14	Miles. 27.61	32	Min. 12½	Miles. 4.8	4,800	1,359	210	28.31	Hours.	Hours.			Pounds. 21,171	Pounds. 18,814	Pounds. 47,629	Pieces. 1,362	Pieces. 1,389	(³)	
Central station.....	Bridge station.....	.55	28,917	\$293,734.27	8	19	15	5 and 6	5,552	192	9	7,218	5,028	7	2,089	12,956	259	9	1,941	1 4	31.03	.....	.....	.....	4,800	300	74	6.25	.....	.....	.....	.....	2,390	.....	5,744	7,227	216	.....	(³)

¹ This station established Oct. 28, 1912.

² No inadequacy.

³ Data unknown; distributed at general post office.

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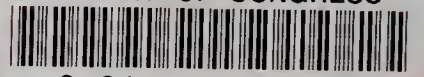
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